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FRACTURES OF THE FEMUR

A Study of End Results in 69 Cases

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FRACTURE of the femur is one of the most disabling injuries known. The period of hospitalization is always long, the permanent disability distressing, and the mortality high. This study was undertaken to determine primarily what happened to patients with fractured femurs at the end of a year and reviews 69 cases, including all the patients with this disability who have been treated during the five years 1926-1930, inclusive, in a large suburban hospital. The lapse of considerable time is essential to determine the final result in a case of fractured femur so all these have been followed for one year or longer. All surgical work should be judged by its end results so the emphasis in this paper is placed upon the final anatomic, functional and economic results obtained rather than upon the methods used to obtain them or details as to the type of injury.

We present this paper in the hope that our experience may be of benefit to others who are called upon to care for this type of injury. While two men were responsible for the care of three fourths of these cases, the study includes every case of fractured femur in the hospital during this five-year period, and covers the work of ten different men. The results, therefore, are representative of the work in the hospital. Of the 69 cases in this series the results at the end of one year are known in all but two cases, which we were unable to trace. This gives us an accurate follow-up in 97 per cent of the cases.

STANDARDS

We classified our results as excellent, poor, and failure. We arbitrarily selected the following standards. An excellent end result was one in which, at the end of a year, the patient was able to walk alone without pain and was able to bear full weight upon the leg. We also required this patient to have at least two thirds the normal motion in the hip in all directions and to be able to flex the knee to a right angle and to extend it fully. There must be less than one inch shortening in the limb and the patient must be able to carry on his or her usual occupation. A poor result was one in which there was no bony union, but the patient was able to get about on crutches, and suffered no pain. A failure was one in which the patient was either unable to be about or died from any cause within the first year. Many authors fail to include deaths from other causes or deaths after the patients have left the hospital, but as we are looking for results one year after the injury we have included all deaths, regardless of cause, that occurred within this period.

TYPES OF FRACTURE

There are many different classifications of fractures of the femur. We chose to separate this group on an anatomic basis and divided them into fractures of the upper end and those of the body or shaft. Under the latter we included the supracondylar fractures. Eliason, writing in Nelson's Loose Leaf Surgery, includes under fractures of the upper end, those of the head, anatomical neck, surgical neck, one or both trochanters, epiphyseal separation of the upper epiphysis and of the epiphysis of the great trochanter. Fractures of the head are always accompanied by a posterior dislocation and are very rare, only fifteen cases having been reported in the literature. Needless to say, we had no case of fracture of the head of the femur.

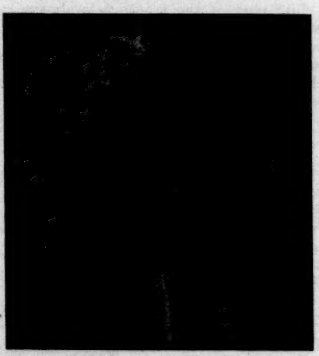

PLATE I. (Case 15.) Intracapsular fracture with complete destruction of the neck.

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CLASSIFICATION OF FRACTURES OF FEMUR

I *Fractures of the Upper Extremity*
- (a) Intracapsular, or fractures of the anatomical neck.
- (b) Extracapsular fracture.
  1. Greater and lesser trochanter.
  2. Intertrochanteric line.
  3. Epiphyseal separation.

II *Fractures of Shaft or Body*
- (a) Upper third.
- (b) Middle third.
- (c) Lower third, including the supracondylar region.

This group also included the pathological fractures.

The so-called extracapsular fracture of the neck of the femur is in reality extracapsular only on the posterior surface, for the line of fracture on the anterior surface is entirely covered by capsule and for all practical purposes the main part of all fractures of the neck of the femur lies within the capsule. Occasionally, in an intertrochanteric fracture, part of the fracture line anteriorly lies inside the joint, but the chief part of the fracture is always extracapsular. It is extremely difficult to draw a sharp line and classify these cases, for frequently the fracture line extends on either side of the capsule. In this series we considered as intracapsular all cases of fracture of the anatomical neck.

TABLE I

INCIDENCE OF FRACTURES

Type	Males	Females	Total	Age Variation	Average Age
Intracapsular	3	19	22	40-90	69
Extracapsular	5	12	17	3-87	62
Shaft	21	9	30	1-61	18
Total	29	40	69	....	....

Of the 39 cases in our series of fracture of the upper end of the femur, 22 were of the intracapsular type. Women predominated in this group by a ratio of more than six to one, there being 19 females and three males. The ages varied from 40 to 90 years, with the average age 69. Fracture of the neck is primarily the fracture of the aged. In fact, it constitutes 50 per cent of all fractures in women over 60 years of age. The causative agent in this group was a fall, usually at home, on a slippery floor or stairs, and the automobile was a factor in only one case.

TREATMENT

Treatment consisted of early reduction, adequate fixation, and later protection from excessive weight bearing. Although ten different doctors directed treatment in this series of cases, the type of treatment was much the same in every case. In intracapsular fracture of the neck of the femur many surgeons base their procedure largely upon the presence or absence of impaction of the fragments. It is often extremely difficult to determine accurately whether or not a fracture is impacted. With two exceptions we treated our cases as though they were not impacted and attempted reduction under an anesthetic. Complete and satisfactory reduction of any fracture is impossible without adequate relaxation. This is especially true of lesions of the femur with its powerful muscular attachments. Careful preliminary medication with one of the barbiturates, such as sodium amytal or nembutal combined with morphine, or pantopon, have proved very useful as a basal anesthetic. Supplementing this with gas-oxygen anesthesia, with the occasional addition of a very small amount of ether, we have been able to reduce every fracture with the minimum of shock. In our hands, spinal novocaine, even when used with ephedrine, has frequently been accompanied by such a marked fall in blood pressure with its unpleasant symptoms, that we advise against its use in elderly people.

After reduction on the Hawley table a plaster spica was applied which included the pelvis and injured limb and was carried down to above the knee on the sound leg. The injured leg was held with the thigh hyperextended, abducted and internally rotated, according to the method of Whitman, for a period of ten to twelve weeks. This was followed by a walking caliper splint for two to three months, and then full weight bearing was allowed.

The importance of protecting the limb from full weight bearing until there is complete bony union is well illustrated by the following case. The patient refused to wear a caliper splint and absorption of the neck took place.

Two patients with well impacted fractures close to the head of the femur had very slight deformity. Reduction and prolonged fixation seemed unnecessary so a Thomas walking splint was applied ten days after the injury without the use of a plaster cast. Both of these people had excellent results and the shortened period of hospitalization with avoidance of prolonged immobilization and its consequent atrophy and absorption of bone make this the method of choice in suitable cases. Unfortunately, the opportunity to use this method is rarely given.

RESULTS

The average period of hospitalization in this group was two and one half months while the total disability averaged six months. With regard to mortality and end results, it was interesting to note that in this group there seemed to be a definite dividing line at 70 years of age, as shown in Table II.

PLATE II. (Case 2.) Original injury.

PLATE III. (Case 2.) Beginning bony union 8 months after injury.

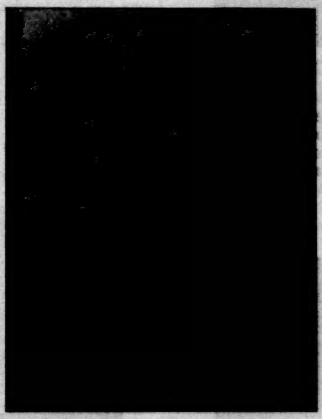

PLATE IV. (Case 2.) Resorption of neck 15 months after injury.

TABLE II

RESULTS IN INTRACAPSULAR CASES

	Under 70 Years	70 Years or Over	Total
Number of Cases	10	12	22
Excellent	8	1	9
Poor	1	2	3
Failure	0	9	9
Unknown	1	0	1
Deaths	0	7	7

In the ten cases under 70 years of age, there was no mortality although active treatment was instituted and maintained in nine of these ten cases. The results one year later were classified as excellent in eight cases, poor in one, and unknown in the case in which no active treatment was given.

The end results in the 12 cases 70 years of age or over present an entirely different picture. We were able to treat actively only three cases and obtained one excellent result, one poor

result and one failure. The excellent result was in a patient 71 years of age with an incomplete fracture with very little displacement. She was treated with a plaster spica by Whitman's method for only six weeks and at three months had solid bony union and full weight bearing. The case with a poor result was a

PLATE V. (Case 10.) Well-impacted fracture with very little deformity. Walking splint at outset. Excellent result.

woman 75 years old who was placed on traction by Buck's extension for three months. At the end of a year she was able to walk with crutches, but had only fibrous union. The third case, also treated by traction, was confined to bed because of general weakness and a hemiplegia which she had suffered four years previous to her fracture. She had no bony union and was listed as a failure.

In the other nine, palliative measures alone were used because the patients' general condition did not seem to warrant an attempt at reduction or prolonged fixation. Of the nine untreated cases seven were dead at the end of a year. Four died within three weeks of the injury, one four months later of pneumonia, one six months later of a cerebral hemorrhage, and one eight months later of pyelitis and terminal pneumonia. This gave a mortality of 60 per cent in this group. Only two of the untreated cases were alive at the end of a year; one with a poor result, the other a failure. It is very doubtful whether either of these cases would have survived any attempt at reduction of the fracture.

EXTRACAPSULAR FRACTURES

The second group of 17 cases of fracture of the upper end of the femur were extracapsular. This group included the fractures of the greater and lesser trochanter, those through the intertrochanteric line and the epiphyseal separations. For various anatomical and physiological reasons the extracapsular type of injury responds much better to treatment. Although the bony injury is frequently extensive the upper fragment is larger and easier to hold in position. A more adequate blood supply hastens and encourages bone repair while there is less synovial fluid present to delay the healing process. Absorption of the upper fragment from malnutrition in this injury is rarely seen. The following plates illustrate the type of injury in this group.

PLATE VI. (Case 28.) Intertrochanteric. Age 3.

PLATE VII. (Case 38.) Badly comminuted.

PLATE VIII. (Case 27.) Intertrochanteric with longitudinal crack upper third of shaft.

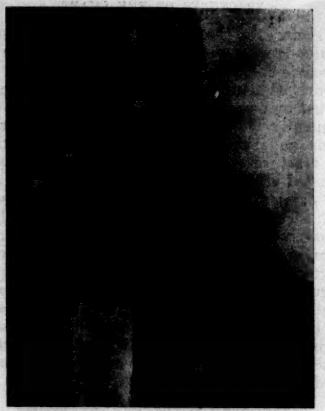

PLATE IX. (Case 29.) Comminuted intertrochanteric with coxa vara traumatica.

INCIDENCE

In our series the females again predominated by a ratio of more than two to one, there being 12 females and five males. The ages varied from 3 to 87 years, the average age being 62. Falling at home on the stairs or floor was the causative agent in the majority of cases. In four instances the patient fell from a height and in one instance the patient was struck by an automobile.

TREATMENT

Treatment varied with the individual case. In several instances there was considerable shortening present from the powerful muscle pull. Traction was instituted by means of Thomas splint or Buck's extension for a period of three to six weeks in an attempt to gain full length. As soon as there was adequate fibrous union the patient was immobilized in a plaster spica for a further period of four to six weeks. The extreme abduction of the Whitman position was rarely found necessary to maintain position in this type of injury. In our experience cases without adequate traction and complete immobilization failed to get union in good position. When the patient was removed from the cast we preferred to have him begin gradual weight bearing, and found a walking caliper splint for several weeks very useful. The period of hospitalization in the extracapsular cases was slightly less than in the intracapsular group.

RESULTS

Our mortality in this group was high. There were six deaths out of 17 cases, or 37 per cent. Again the cases under 70 years of age made a much better showing than those who were older.

TABLE III

RESULTS IN EXTRACAPSULAR CASES

	Under 70 Years	70 Years or Over	Total
Number of Cases	8	9	17
Excellent	5	3	8
Poor	2	1	3
Failures	1	5	6
Deaths	1	5	6

Of the eight cases under 70 there were five excellent results, all in cases that had been well immobilized for a period of six to eleven weeks. We failed to get bony union in the two cases listed as poor, which was no doubt due largely to incomplete immobilization. There was one death in an untreated case who died from shock and internal injuries four hours after admission. Of the nine cases 70 years of age or over, five were dead within three months and were listed as failures. No immobilization of the fracture was attempted in any of these cases as in each instance the patient's general condition would not warrant interference. Of the four cases alive at the end of a year there were three excellent results and one poor one. The excellent results were all in patients who had their fractures completely immobilized for a period of at least two months. The poor result was an 87 year old woman who was not immobilized because of her age and the danger of hypostatic pneumonia. She got out of bed and was up on crutches within three weeks of her accident, and naturally did not get bony union. In this group of extracapsular fractures, patients who survive the original injury and who have proper fixation do extremely well.

FRACTURES OF THE SHAFT

Fracture of the shaft of the femur usually results from a direct blow, while falls are responsible for most injuries to the neck of the femur. Fracture of the shaft is always accompanied by some damage to the soft tissues and frequently the injuries to blood vessels, nerves, fascia and skin are of more importance than the fracture itself. If the fracture is compounded other problems present themselves and the dangers of infection are increased many fold. The fracture line may be classified as transverse, oblique or spiral, and frequently there is considerable comminution with many fragments of bone resulting. Overriding of fragments and shortening of the limb from powerful muscle pull occur within a few hours of the injury. Treatment was essentially the same whether the fracture line was oblique, transverse, or located in the upper, middle or lower third of the shaft.

INCIDENCE

In our series, fractures of the shaft of the femur were largely fractures of young people. There were 30 cases in this group. The ages ranged from one year to 61 years. The average age was 18 years. Twenty-two of the cases were 18 years of age or younger. There were 21 males and seven females, a ratio of three to one. The automobile was the chief causative agent in this group. Direct violence rather than transmitted strains causes fracture of the shaft.

TREATMENT

The most important measure in treatment of fracture of the shaft of the femur is the early application of traction. Delay is inexcusable and always makes the problem more difficult. Immediate application of skin or skeletal traction prevents extensive shortening and soft tissue damage. The chief problem in every fracture of the shaft is to obtain and maintain adequate traction. With children adhesive skin traction in our hands has always proved adequate. With adults we prefer skeletal traction. With infants and small children the leg was suspended in a vertical position with the buttocks barely resting upon the bed. In all other cases the Thomas splint with elevation of the foot of the bed for countertraction was the method of choice. Pathological fractures, delayed union and problems of reduction must be considered in this group.

PATHOLOGICAL FRACTURES

There were three pathological fractures in this series—one a supracondylar fracture in a patient with double Charcot's joints from syphilis. This patient was placed in a cast. At the end of a year she had shown very little evidence of bone repair. She will probably never be able to walk because of her underlying disease and the extensive destruction of bone.

The second case was a fracture of the upper third of the shaft in a patient who had previously been treated for Hodgkin's Disease. She was transferred to another hospital and the end result was unknown, but undoubtedly it was bad as there was considerable destruction

PLATE X. (Case 66.) Supracondylar fracture in patient with bilateral Charcot's joints.

of the upper end of the shaft of the femur. This was diagnosed as a metastatic malignancy by the roentgenologist.

The third case was in a patient who had had her breast removed three years before for carcinoma. One month before the present admission a small recurrent nodule had been removed from the scar. Her leg gave way spontaneously while she was walking about the house, without any history of injury, and we felt from the outset that we were dealing with a pathological fracture. Repeated x-rays showed no evidence of metastatic malignant disease in the bone and as there was considerable evidence of repair, clinically and by x-ray, a biopsy was done at the end of three months, which proved that the condition was a malignant metastasis from the breast. This patient died two months after leaving the hospital.

These three cases show very clearly the importance of always having pathological fractures in mind, especially when there is history of very slight trauma. There were four deaths in the 30 cases of fractures of the shaft, and the average stay in the hospital was 50 days. Excluding the three cases of pathological fracture, we have 27 cases with fracture of the shaft from trauma alone. This group furnishes

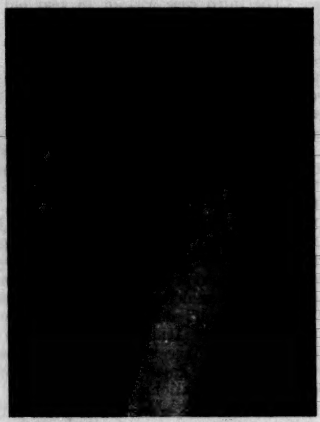

PLATE XI. (Case 67.) Spontaneous fracture. Breast removed for carcinoma 3 years previously.

PLATE XII. (Case 67.) Metastatic carcinoma with beginning repair. Three months after injury.

the largest proportion of excellent results because the vast majority of the fractures were in young people. Table IV shows the results in this group.

TABLE IV

RESULTS IN FRACTURES OF THE SHAFT

	Pathological	Traumatic	Total
Number of Cases	3	27	30
Excellent	0	19	19
Poor	0	4	4
Failure	2	4	6
Unknown	1	0	1
Deaths	1	3	4

Of the four cases classed as failures, two were in children who died of fractured skulls within a few hours of admission. The third was in a man who died of ruptured kidney and suppression of urine five days after the injury, and the fourth was in a woman 35 years of age with supracondylar fractures of both femurs, who was unable to walk alone at the end of a year because of bad knock-knee deformity.

Of the four poor results the first was a five year old child who had an oblique fracture at the junction of the lower and middle third of the shaft of the femur with the proximal fragment anterior and overriding at the end of five weeks' traction. The family took the child home against advice. Because of the child's age it was felt that the shortening and deformity would probably be made up in time although the result could not be classed as excellent at the time of discharge. However, at the end of one year this child had only one inch shortening. The second case was a 14 year old boy who had a stiff knee from an injury six years previously. His fracture was only three inches above the knee. He got solid union, but naturally was unable to move his knee which had previously been stiff. His result, however, could hardly be classed as excellent. The third case was a 15 year old boy who, one year later, had one inch shortening following a compound fracture of the midshaft. The fourth case was a woman 61 years of age with a fracture just above the knee-joint which resulted in a stiff knee because of an old arthritis.

We have been opposed to operative interference in children because the simpler methods have given us so many excellent results. In adults we strongly urge the use of skeletal traction if satisfactory position is not obtained by skin traction within a very few days. Ice tongs, the Kirschner wire, and the Steinmann pin are all of value.

The restoration of normal anatomical position in the adult is of great importance, and in three cases where we have been unable to get the bony fragments together by skin or skeletal traction, we have done an open operation. Each time intervening soft parts have been found which prevented the bridging of periosteum.

The other 19 cases had perfect anatomical and functional results.

TABLE V

TOTAL MORTALITY FROM ALL CAUSES DURING THE FIRST YEAR

Type of Fracture	Number of Cases	Number of Deaths	Mortality
Intercapsular	22	7	32%
Extracapsular	17	6	35%
Shaft	30	4	13%
Total	69	17	25%

OPERATIVE CASES

The six operative cases were a débridement of a compound fracture, insertion of tongs for skeletal traction in two cases, and three cases of bone plating to obtain good position, one with subsequent bone graft for delayed union.

(1) The youngest, a 15 year old boy, fell some 30 feet from a staging, receiving a compound fracture of the midshaft of his femur. A débridement of the wound was done and the limb was placed in a plaster spica in satisfactory position. Two weeks later two inches shortening was noted by x-ray. Adhesive skin traction was then applied, but the shortening was not entirely overcome. Because of the boy's age it is very probable that this slight shortening will be made up by compensatory growth.

(2) The second case, a 17 year old Italian boy, received a transverse fracture three inches above his knee joint. The patient was not placed on traction, but was placed in a plaster spica as the fragments seemed to be securely locked and held. To save hospital expense he was sent home at the end of ten days in his cast. His cast was broken at home and at the end of six weeks, when he returned to the hospital, his fragments had slipped, and there was two inches shortening. Operation under these circumstances was necessary so bone plating was done, with a leg of normal length resulting. The bone plate was removed at the end of eight weeks. At the time of discharge the patient had solid bony union, was able to bend his knee to a right angle, and clinically had an excellent result. The failure to obtain a good result by closed means would certainly have been obviated by applying traction for the first few weeks.

(3) The third case was an 18 year old boy who received a comminuted fracture of the midshaft from a football injury. Skin traction was considered inadvisable because there was two inches overriding so skeletal traction was instituted by ice tongs placed well above the condyles. At the end of five weeks the patient was placed in a spica. His wounds healed perfectly, and at the end of one year, he had no stiffness and could bend his knee well past a right angle.

(4) The fourth patient, a woman of 35, had multiple fractures, including fractures of both femora just above the condyles. Her general condition was very poor. At the end of several days skeletal traction was applied by means of tongs. There was delayed union. One femur held nicely without shortening, with excellent position; the other femur had delayed union with slight knock-knee resulting, and considerable stiffness at the knee because of the longer period of immobilization.

(5) The fifth case, a woman 40 years old, received an oblique fracture of the midshaft of the femur in a distant city. She was driven 100 miles over a rough road without any splinting or fixation whatever so that when she arrived at the hospital there was marked overriding of the fragments by x-ray and nearly four inches shortening of the leg. The patient was in severe shock. Skeletal traction was applied, but at the end of two weeks we were unable to get the fragments in line although 35 pounds of weight had been applied and we had obtained full length to the leg. Open operation was done. A large fragment of muscle and fascia was removed, and bone plating was done. Eight weeks later it was necessary to remove the bone plate as the screws had broken due to defective material. The patient obtained solid bony union with an excellent functional result, without shortening, at the end of eight months.

PLATE XIII. (Case 64.) Intervening fascia and muscle prevented apposition of the bony fragments, requiring open operation.

PLATE XIV. (Case 64.) Breaking of bone screws due to defective material.

(6) The sixth case, a fracture of the mid-shaft of the femur, was a woman 40 years old who had previously had tuberculosis of the spine with a severe kyphos deformity. It was the most interesting and troublesome case in our series. Because of the patient's history of tuberculosis, skin traction was attempted for two weeks, but we were unable to get the bones in satisfactory position. An open operation was then done and the femur plated with Sherman steel plate. At the end of three months there was very little evidence of bony repair and there was considerable absorption of bone about the screws. The plate was then removed and a graft taken from the opposite tibia reinforced by several osteoperiosteal shavings. Two months later there was slight evidence of bone repair. The patient was placed in a walking leather spica, and ten months after the bone grafting had solid bony union.

PLATE XV. (Case 65.) Overriding from muscular pull.

PLATE XVI. (Case 65.) Bone graft for delayed union.

PLATE XVII. (Case 65.) Solid bony union 14 months after injury.

SUMMARY

(1) The end results one year after injury are reported in a series of 69 cases of fracture of the femur.

(2) The six operative cases in the series are briefly abstracted.

(3) There were three pathological fractures in the series.

(4) The mortality in fractures of the neck of the femur was 33 per cent, in fractures of the shaft 13 per cent, and for the entire series 25 per cent.

(5) Fracture of the hip occurs chiefly in women over 60 years of age while fracture of the shaft is seen most often in children and young adults.

(6) Fractures of the upper end of the femur sufficiently immobilized gave excellent results in individuals under 70 years of age.

(7) Prolonged immobilization of feeble individuals over 70 years of age is unwise and the mortality even without active treatment is high.

(8) Adequate traction is the most important procedure to institute in fractures of the shaft of the femur.

INTRACAPSULAR FRACTURES

Identity	Sex	Age	Cause	Hospitalization	Treatment	Results One Year Later	Remarks
(1)	F	40	Spontaneous.	100 days	Cast Whitman position 10 wks. Thomas walking splint 4 mos.	Excellent	Two previous fractures in same region from Paget's Disease—one 4 yrs. ago; one 16 mos. ago.
(2)	F	50	Fall on ice.	40 days	Cast Whitman position 12 wks. Crutches 5 mos.	Poor	15 months after injury had a fall, began to limp. X-ray showed absorption of neck.
(3)	F	58	Fall on street.	190 days	Cast Whitman position 12 wks. Thomas splint 4 mos.	Excellent	Walking well, only ½" shortening.
(4)	M	60	Fall on stairs.	90 days	Cast Whitman position 10 wks. Thomas abduction splint 4 mos.	Excellent	
(5)	F	61	Fall on stairs.	100 days	Cast Whitman position 10 wks. Then crutches.	Excellent	
(6)	F	64	Fall at home.	120 days	Cast Whitman position 12 wks. Caliper 4 mos.	Excellent	Very little displacement. Fracture near trochanteric line.
(7)	F	67	Struck by auto.	24 days	10 days' bed rest. Then convalescent splint 12 wks.	Excellent	Impacted close to head.
(8)	F	68	Fall	10 days	Sand bags.	Unknown	Unable to trace.
(9)	F	69	Fall over her dog.	90 days	Spica 10 wks. Then crutches.	Excellent	
(10)	F	69	Fall down two stairs.	11 days	Thomas splint after 10 days. Wt. bearing at end of 4 mos.	Excellent	Very little displacement. Impacted.
(11)	M	70	Fall on walk.	15 days	"T" splint only because of poor general condition.	Poor	Walking on crutches at end of year. Fibrous union. Comfortable.
(12)	F	70	Fall.	30 days	"T" splint only.	Failure	Blood pressure 220. Died of cerebral hemorrhage 6 mos. after injury.
(13)	F	71	Fall on ice.	58 days	Cast Whitman position 6 wks. Wt. bearing at end of 3 mos.	Excellent	Incomplete fracture.
(14)	F	71	Fall at home.	9 days	Sand bags.	Failure	Died in 9 days of pneumonia.
(15)	F	75	Fall on stairs.	190 days	Buck's extension 12 wks. Then crutches.	Poor	Walking with crutches with help. Fibrous union.
(16)	F	75	Fall on stairs.	41 days	Thomas splint 2 wks. Then posterior wire because of mental state.	Failure	Died in 4 mos. of pneumonia.
(17)	F	75	Fall on floor.	30 days	"T" splint only for 4 wks.	Failure	Confined to bed and wheel-chair on account of general weakness. Fibrous union.
(18)	F	75	Fall on floor.	100 days	Buck's extension 3 mos. Then crutches.	Failure	Right hemiplegia 4 yrs. ago. Helpless now. Fibrous union.
(19)	F	79	Fall on stairs.	43 days	Sand bags.	Failure	Cystitis. Died of pneumonia 8 mos. later.
(20)	F	82	Fall on stairs.	7 days	Nothing.	Failure	Died 2 wks. later of shock. In nursing home at time.
(21)	F	84	Fall at home.	7 days	Sand bags 1 wk.	Failure	Died 3 wks. later—myocardial failure.
(22)	M	90	Fall on floor.	6 days	Sand bags.	Failure	Died of pneumonia 6 days after injury.

EXTRACAPSULAR FRACTURES

(23)	F	3	16 ft. fall.	25 days	Traction 3 wks. Cast 6 wks.	Excellent	Also had ruptured kidney.
(24)	M	40	30 ft. fall.	4 hrs.	None.	Failure	Died in 4 hrs. of shock and internal injuries.
(25)	F	48	Fall on floor.	110 days	Whitman position—spica 11 wks.	Excellent	Only ½" shortening. Normal motion in all directions.
(26)	M	50	20 ft. fall.	65 days	Thomas splint with traction 3 wks. Spica 3 wks. Bed rest 3 wks.	Excellent	Pt. very uncoöperative. Removed cast himself, but with no bad effects.
(27)	M	54	Fall down flight of stairs while intoxicated.	23 days	Thomas splint — traction 1 wk. Then spica.	Excellent	Transferred to another hospital, where he was kept in cast 12 wks. Then crutches for 2 mos.
(28)	F	64	Fall on icy sidewalk.	88 days	Spica 6 wks. Walking splint 3 mos.	Excellent	
(29)	F	65	Fall at home.	58 days	Thomas splint 1 month. Then up on crutches.	Poor	Able to walk with crutches with support. No bony union.
(30)	F	68	Fall at home.	54 days	"T" splint — Bradford frame 6 wks. Then crutches.	Poor	Able to walk with crutches with support. No bony union.
(31)	F	70	Fall at home.	28 days	"T" splint 10 days.	Failure	Patient died 3 mos. after injury of bronchopneumonia.
(32)	F	72	Fall at home.	5 days	Sand bags.	Failure	Pernicious anemia also. Died of pneumonia 5 days after injury.
(33)	F	72	Fall at home.	30 days	Posterior wire splint for toe drop, and "T" splint.	Failure	Died at home 3 mos. later—myocardial failure.
(34)	M	73	Knocked down by auto.	130 days	Spica 2 mos. Then crutches.	Excellent	Walked well with crutches in 4 mos. Good motion at hip and knee.
(35)	M	74	Fall at home.	85 days	Thomas splint and traction 2 mos.	Excellent	Cerebral hemorrhage 2 yrs. ago with partial paralysis left leg. At discharge good union—large callus.

(36)	F	76	Fall at home.	1 day	Transferred to another hospital.	Failure	Died 4 days later of pulmonary embolus.
(37)	F	77	Fall at home.	110 days	Buck's extension 5 wks. Then bed rest 6 wks. Crutches.	Excellent	No displacement. Walking with cane with slight limp at discharge.
(38)	F	77	Fall on stairs.	26 days	Buck's extension 10 days.	Failure	Became mentally confused. Traction. Died of pneumonia 26 days later.
(39)	F	87	Fall on stairs.	30 days	Sand bags 3 wks. Crutches.	Poor	Able to sit up in chair—too weak to walk alone.
					FRACTURES OF THE SHAFT		
(40)	M	1	4 ft. fall.	40 days	Skin traction 5 wks. Then spica 4 wks.	Excellent	Fracture midshaft, greenstick type.
(41)	M	2	5 ft. fall.	30 days	Traction 4 wks. Then cast 4 wks.	Excellent	Fracture middle third.
(42)	F	3	Knocked down by motorcycle.	42 days	Traction 5 wks. Then spica 6 wks.	Excellent	Fracture 3" below hip joint.
(43)	M	4	Knocked down by auto.	73 days	Traction 3 wks. Then spica 6 wks.	Excellent	Pressure sore over tendo achillis from traction. Healed 1 month after discharge.
(44)	M	5	Knocked down by auto.	42 days	Traction 5 wks. Then cast 4 wks.	Excellent	Fracture 3½" above knee.
(45)	F	5	Knocked down. Struck by auto.	38 days	Traction 5 wks. Spica 6 wks.	Excellent	Fracture junction middle and lower third. Good callus. No shortening.
(46)	M	5	Hit by auto.	40 days	Traction 5 wks. Home in cast.	Poor	Oblique fracture junction middle and lower third. Discharged against advice. Proximal fragment anterior ¾" overriding.
(47)	M	6	Hit by auto.	6 hrs.	None.	Failure	Died of fractured skull. Both femora fractured.
(48)	M	6	Hit by auto.	3 hrs.	None.	Failure	Fracture 4" above knee. Fractured skull.
(49)	M	9	Hit by auto.	42 days	Traction 5 wks. Cast 6 wks.	Excellent	Midshaft. Cut tendon of hand on glass while in cast.
(50)	M	9	Hit by auto.	35 days	Traction 4½ wks. Cast 6 wks.	Excellent	Midshaft.
(51)	M	9	Hit by auto.	82 days	Traction 5 wks. Cast 6 wks.	Excellent	Acute tonsillitis. T. & A. done before discharge.
(52)	M	10	Hit by auto.	35 days	Traction 4½ wks. Cast 6 wks.	Excellent	Fracture midshaft.
(53)	M	10		32 days	Traction 4 wks. Spica 5 wks.	Excellent	Fracture midshaft.
(54)	M	11	Football.	30 days	Traction 4 wks. Spica 4 wks.	Excellent	Fracture comminuted midshaft.
(55)	M	12	Fell off bicycle.	40 days	Traction 5 wks. Spica 6 wks.	Excellent	Comminuted fracture upper half of midshaft.
(56)	M	13	Football.	50 days	Traction 5 wks. Spica 10 wks.	Excellent	Midshaft. Delayed union. Wore a caliper 3 mos. after cast was removed.
(57)	M	14	Coasting accident.	6 days	Cast 6 wks.	Poor	3" above knee. Patella absent with stiff knee.
(58)	M	15	Fell 30 ft.	82 days	Operation—cast 15 days. Traction 30 days. Spica 30 days.	Poor	Compound. Midshaft. ¾" shortening.
(59)	M	16	Auto.	100 days	Traction 9 wks. Spica 4 wks.	Excellent	Midshaft.
(60)	M	18	Football.	80 days	Spica 6 wks. Open operation and bone plating, and cast 8 wks. for 2" shortening.	Excellent	3" above knee. Slipped in spica. Able to walk. Knee bends to right angle.
(61)	M	18	Football.	40 days	Skeletal traction 5 wks. Plaster spica 8 wks.	Excellent	Comminuted fracture midshaft.
(62)	F	35	Spontaneous fracture.	2 days	Transferred to another hospital.	Unknown	Pt. had previously been treated for Hodgkin's Disease. Probable malignant disease with metastasis.
(63)	F	35	Auto accident.	246 days	Skeletal traction both femurs 8 wks. Caliper.	Failure	Knock-knee deformity. Fractures both femurs above knees.
(64)	F	40	Auto accident.	55 days	Skeletal traction 2 wks. Bone plating. Plate out at end of 14 wks.	Excellent	Screws broken. Plate had to be removed. Rode 100 miles in auto after accident without any fixation.
(65)	F	40	Auto accident.	90 days	Skin traction 2 wks. Bone plate and cast 10 wks. Bone graft.	Excellent	Midshaft. Delayed union. Solid union 10 mos. after injury.
(66)	F	49	Fall at home. Pathological fracture.	20 days	Cast 5 wks.	Failure	Charcot's joint.
(67)	F	52	Spontaneous fracture. Metastatic carcinoma.	105 days	Traction 10 wks. Biopsy.	Failure	Metastasis from carcinoma of breast removed 3 years previously. Pt. died 2 mos. after leaving hospital.
(68)	M	52	Crushed between two street cars.	5 days	Thomas splint—skin traction.	Failure	Died of suppression of urine 5 days after injury.
(69)	F	61	Fall at home.	12 days	Plaster spica, and sent home.	Poor	Fracture femur above rt. knee. Stiff knee.

NEW ENGLAND SURGICAL SOCIETY

POSTOPERATIVE THROMBOSIS AND EMBOLISM*

BY ERNEST L. HUNT, M.D.†

DESPITE the many and increasing safeguards with which the surgical patient may be surrounded, and despite the skill and ingenuity of the surgeon there are still encountered certain complications or sequelae to operations which baffle and torment him. Among these, if measured by the disabilities and disasters which follow in their train, thromboses and embolisms are outstanding examples. Dr. Leonard Rowntree[1] well says, "The question of pulmonary embolism is one that demands the thoughtful consideration of every surgeon. Pulmonary embolism is always a tragedy, is always untimely and harrowing to the doctor and to the patient's family. It always appears to be an unnecessary cause of death and is a challenge to our combined forces."

SURVEY OF 12 YEARS' EXPERIENCE

At Worcester City Hospital during the past 12 years, we have had 55 deaths which were clinically characteristic of deaths from pulmonary embolism. During the same period there have occurred 6,041 deaths from all causes (except stillbirths). This gives an incidence in relation to deaths of 0.9 per cent.

During the period 1920-1931 there were 19,459 operations exclusive of adeno-tonsillectomies. Of these, 93 developed thrombotic complications and 22 died of pulmonary embolism, which is an incidence in relation to operations of 0.48 per cent for total thromboses or 0.11 per cent for fatalities due to pulmonary embolism or one death to every 875 operations.

The operative, obstetrical, and traumatic cases in which thrombosis was a recognized factor numbered 137 as against 43 cases classed as medical.

Inasmuch as the influenza epidemics are considered by some to have a bearing upon incidence of thrombosis, a comparison was made between the influenza cases reported to the Health Department and our postoperative group year by year. The result has been tabulated and with the possible exception of 1922 which was the second highest year in regard to influenza and highest in regard to postoperative thrombosis there is no relationship apparent. As the year 1920 had seven thrombosis cases and 1603 of influenza, while 1921 had the same number of thromboses with but 45 of influenza, it is evident that there is no general or constant relationship shown.

In the matter of sex the females in our postoperative group outnumber the males by 2 to 1. This preponderance is largely found in the age periods between 20 and 40 although in the period below 20 there are seven females and one male. The sex incidence tends to equalize after 40, and after 70 the males preponderate. Obviously our series is too small to justify any sweeping deductions. The rather high proportion of young people was a surprise to me. In our traumatic group a girl of four having a lacerated wound of the knee developed a femoral thrombophlebitis. The ratio of fatalities was lowest in the age group 10-20 and the single death in that group was of a girl with a tuberculous infection. (Graph No. 1.)

As regards the anatomical regions subject to the operative procedure we find the highest gross number as well as the highest ratio to operations performed to be in the abdominal group. It happens that in my tabulations the hysterectomies and the combined cervical or perineal and internal operations on the female genitalia were considered for purposes of tabulation as abdominal.

The yearly incidence is quite variable, the peak year being 1922 as Rosenthal has shown to be the case in the central European countries. The ratio of nonfatal to fatal cases is not constant and I am glad that I can show an improvement in 1931 over previous years and shall later discuss a possible reason for it. (Graph No. 2.)

The physical habitus is not shown to be of considerable moment. There were 12 patients who were fat, 13 who were thin and 68 who were average well nourished.

The ratio of infections both primary and complicating was unexpectedly small. Of the 71 nonfatal cases, 17 were primarily infected and required drainage. Of the primarily clean, one developed severe wound sepsis, seven developed mild sepsis, while 46 remained clean throughout, Of the 22 fatal embolism cases, seven were primarily infected and drained. One primarily clean developed severe sepsis, two developed mild sepsis, and twelve remained clean up to the time of death.

Cardiac impairment was recognized in 17 of the cases which recovered and eight of those who succumbed.

Of the nonfatal cases having thrombo-

*Read before the New England Surgical Society, at Hartford, Conn., October 3, 1932.

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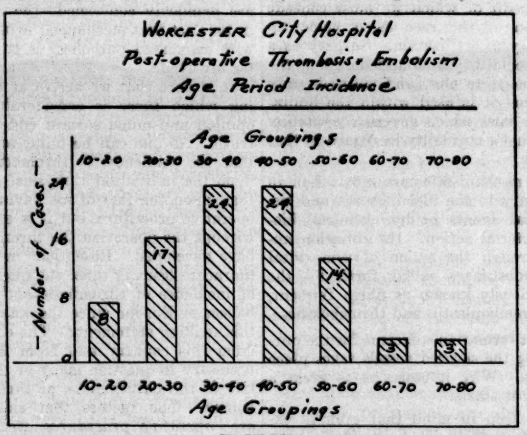
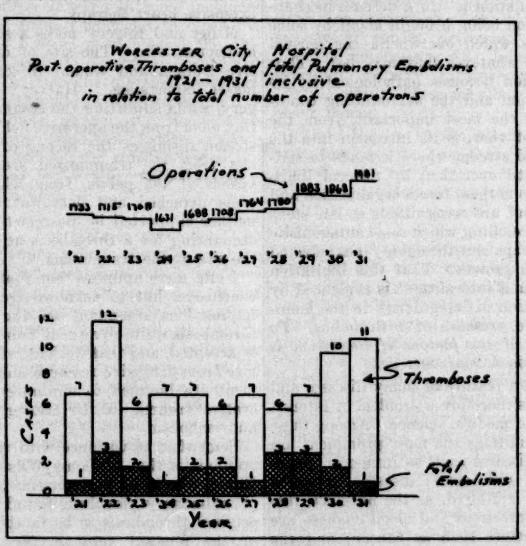
phlebitis of the lower extremities, 16 had the right, 45 the left, and nine both legs involved.

Of the 71 nonfatal cases seven had definite pulmonary infarcts and in three the infarcts preceded the swelling of the extremities. Of the 22 cases of fatal emboli, seven had recognized thrombophlebitis of an extremity prior to the involvement of the lungs.

The periods of hospitalization among the 71 nonfatal thrombosis cases were greatly prolonged. Allowing 14 days for the average stay of the clean laparotomy and hernia and five weeks for the average prostate I find that the complications required 1,899 patient days in excess of a fair normal, which at an average cost of five dollars per day is equivalent to a loss of 9,495 dollars.



GRAPH NO. 1.


Worcester City Hospital
Post-operative Thromboses and fatal Pulmonary Embolisms
1921 – 1931 inclusive
in relation to total number of operations
Operations
1733 1715 1708 1631 1698 1708 1764 1780 1883 1948 1901
'21 '22 '23 '24 '25 '26 '27 '28 '29 '30 '31
Cases
0 2 4 6 8 10 12
7 12 6 7 7 6 7 6 7 10 11
3 2 1 2 2 1 3 3 3 1
Thromboses
Fatal Emboli
'21 '22 '23 '24 '25 '26 '27 '28 '29 '30 '31
Year

GRAPH NO. 2.

DISCUSSION OF THE GENERAL PROBLEM

Thrombosis is primarily a physiological process constituting an essential defense mechanism to the credit of which we must concede the preservation of the race as it came up through savagery to civilization. Surgery as a therapeutic possibility is founded upon the power of the blood to clot, and succeeds only to the extent that it is used within the limitations set by the laws which govern coagulation and the individual's normality in regard to that function.

This defense mechanism comes into action in response to injury to the blood vessels and tissues by physical agents or by chemical, biochemical or bacterial action. Its initiation appears to be through the action of some vital substance or substances called forth by the injury and variously known as fibrin ferment, early toxins, thromboplastin and thrombokinase.

Normally, clot formation sufficient for the purpose of plugging the severed vessels takes place and then ceases. Why it ceases is as great a mystery as why it starts.

It is well to keep in mind that even in extreme cases of pathological thrombosis, the process of coagulation is still a defense mechanism, its overaction being brought about by some cause or causes which overwhelm the normal limiting factors whatever they may be*. Thus a normal reaction becomes pathological by its excess, its location and the surrounding conditions, of which the most important, from the surgical point of view, is its intrusion into the centripetal blood stream where it tends to self-propagation until overtaken by natural limiting forces. Among these forces organization and "endothelization" are recognizable as late steps in the process preceding which some antagonistic substance (perhaps antithrombin) has effected cessation of the growth. That this limitation may be partial and intermittent is evidenced by clinical observation of irregularity in the manifestations of the presence of a thrombus. *To acquire control of the factors of limitation is the challenge which confronts us.*

Thrombosis is a feature of many diseases and conditions and is therefore a problem of interest to all branches of medical science. Among these diseases and conditions the most prominent are the infectious diseases such as influenza, pneumonia, typhoid and sepsis; diseases in which the blood itself is altered, as the anemias; diseases in which infections and blood changes are complicating factors such as cancer; and the infectious, toxic and degenerative diseases of the vascular system. Traumatisms, such as fractures, childbirth and operations, are conditions in which thromboses occasionally attain pathological proportions with disastrous results and it is with such situations that we as surgeons are primarily concerned—the distinction lying in the fact that mechanical injury to the tissues with associated pathology is the activating factor involved.

It is here that we arrive at a point concerning which there is considerable difference of opinion and much earnest endeavor to find the truth. No one can be blind to the probability that the tendency to thrombosis may depend upon the individual's physical condition rather than upon the fact of his having undergone an operative procedure, but it is equally clear that without the operation the thrombosis would not have developed. Rosenthal[2] in a review of the literature bearing upon the question of increase of incidence of thrombosis and pulmonary embolism in Europe since the war, concludes with this striking statement: "The conflict in reports from this country and from Europe makes it necessary to question many of the concepts relative to the pathogenesis of thrombosis and embolism. The factors that can be discounted are: *operative procedures*, weather conditions, the influenza epidemic, intravenous therapy and extensive heart therapy."

Miller and Rogers[3] make a somewhat similar statement, viz., "The site of operation, operative trauma and wound infection are not of major importance." Harvey[4] in Nelson's Surgery, while admitting the frequent discharge of tiny clots from the operative field into the venous stream dismisses the theory of extension of a clot from the traumatized area to the larger vessels of the pelvis, from which sections become detached and float up to the lungs, as neither supported by postmortem evidence nor accounting for a thrombosis at a distance from the site of the traumatism.

I cite these opinions, not that I feel they are conclusive, but to acknowledge that there are implications attendant on the phenomena of thrombosis quite divergent from those commonly accepted, and that workers whose opinions derive from extensive research and balanced judgment are inclined to minimize the rôle of operative trauma in the etiology of thrombosis and embolism.

Somewhat at variance with the above quoted opinions is that of Louis Wilson[5] of the Mayo Clinic, who in 41 postmortems on 47 fatal cases of pulmonary embolism found the site of the original thrombosis to be in the operative field or the femoral vein in 28. Wilson writes, "There can be no question but that the constantly present small thrombi in injured vessels form a nidus for the subsequent development of large, loose thrombi through the activity of other factors." Hosoi[6] and Pirker[7]

*In his Balfour lecture last April, Professor Rudolph Matas used the term thrombophilia to designate an abnormal tendency to thrombosis which characterizes certain individuals just as hemophilia denotes the opposite or a tendency to bleed.

both cite cases of patients dead of pulmonary embolism following laparotomy, in which thrombi were found originating in the deep epigastric veins and extending to the iliacs. Hosoi, like Wilson, considers "trauma an important factor when other factors are also present". Clark's[8] conception of the growth of a clot by self-propagation against the current has seemed to me sufficiently tenable to compel the operator to observe every precaution to avoid unnecessary injury to the deep epigastric veins and veins of the pelvic plexuses as might occur by bruising with retractors and transfixion by sutures. It is clear that there are obstacles to the full acceptance of Clark's theory, not the least being the difficulty of producing such a condition experimentally even when the veins are ligated and severely traumatized, until other factors such as the introduction of infected foreign substances are brought into play (McLean[9]). Armentrout[10] of Cincinnati, in a beautiful series of experiments injected foreign substances of various kinds, under visual check, into the pial vessels of cats and observed the results. He found that minute fragments of blood clot caused very little trouble and did not propagate until mixed with cultures of hemolytic streptococci, when in some instances a secondary clot formed sufficient to block the stream. If flow became reëstablished the animal lived, if not he died. Emery and powdered glass, however, became the starting points of long, worm-like thrombi which waved in the rapidly failing blood stream, and the animals soon died. He interpreted these results as showing that the thromboplastic substance was liberated to a much less extent when the endothelium was uninjured.

Admitting trauma to be an essential factor in the initiation of a massive thrombosis, its bearing upon prophylaxis is apparent. As a practical matter of technique, until we have a specific control of thrombogenesis it is the part of wisdom to observe certain precautions which may be expected to minimize the liberation of clot-producing substances. I believe we accomplish something in this direction by (1) taking particular pains to avoid bruising and puncturing the deep epigastric vessels when making upper or lower rectus incisions. (Avoid muscle splitting if possible and when the vessels are torn or cut, tie them carefully. It is better to cut and tie them than to stretch them with retractors.)

(2) When working about the broad ligaments, control bleeding by isolated ligature rather than by over and over suture. Transfixion of a vein by a suture should be avoided as the suture becomes a foreign body within the lumen and would naturally start the building up of a clot. If such a suture is placed remove it.

(3) Deep retractor blades may impinge upon iliac vessels or the inferior vena cava. Be careful in their use and change their positions occasionally.

(4) Tie veins carefully. Since they do not always bleed from the proximal segments we may miss them. I think it possible that thrombogenic tissue juices may find their way into the blood stream through such open ends.

(5) Suture the tissues carefully, avoiding the use of cutting needles. Always use the finest suture material that can be relied upon and minimize the number and size of knots that remain buried.

(6) When operating upon varicose veins, proximal ligation should be the first step.

While the operative trauma may be the spark which touches off the train of events leading up to pathological thromboses other factors alluded to above are perhaps no less important and similarly dictate precautionary measures based upon their known influence. Among these the most prominent are the following: (1) changes in the blood itself of such a nature as to increase its tendency to form clots; (2) blood stasis due to slowing of the blood stream from mechanical causes, depressed circulation and lowered metabolism; (3) influence of disease processes, notably cardiovascular conditions; (4) infection. These may be considered in the order named.

(1) *Changes in the blood itself* — Notable work has been done on this phase of the problem, adequate review of which would require another paper. Because they have seemingly been fruitful in practical results I wish to mention the work of C. A. Mills[11] and of Bancroft, Kugelmass, and Stanley-Brown[12]. Mills studied the effect of diet upon coagulation and the New York group confirmed his findings and applied their methods of testing the clotting power of blood to the surgical problem. A constant relation between diet and coagulation factors was shown, a high protein intake being reflected in increased clotting power while a carbohydrate diet diminished it. Applying the tests to operative cases a fairly definite relationship was found between a high clotting index and postoperative thrombosis. Twenty-seven cases of thrombosis and seven of embolism were studied and all but one gave increased indices. Applying this finding to possible therapeutic methods they found that sodium thiosulphate solution given intravenously had a restraining effect on the elevation of the index and reported favorable results in two series of 22 patients each, two of the untreated developing phlebitis while the treated group were normal. Used in cases

which had developed phlebitis and emboli, prompt improvement resulted. C. R. Murray[13] applying it as a prophylactic in the fracture clinic at Presbyterian Hospital with check of the clotting indices, reported apparent control of pulmonary complications in three cases of hip fractures in elderly patients.

Since discussing the work with Dr. Stanley-Brown in August, I have used the treatment in two cases, one a thrombophlebitis following a breast abscess, that made a rapid improvement, and the other a thrombophlebitis in a 52 year old man, beginning 17 days after a clean hernia done under local anesthesia, with multiple lung emboli followed by swelling of the right leg. This patient now appears to be convalescing safely. The solution has the virtue of being quite innocuous in itself.

This work has much promise. The tests are, however, too complicated for routine clinical application except by a trained biochemist, and a simpler method is much desired by Bancroft and Stanley-Brown. Howell's[14] discovery of an anti-coagulant which he isolated from a dog's liver and named heparin deserves attention as having a possible field in this connection. Up to the present its scarcity and cost, its uncertainty as regards impurities and stability prevent its having a therapeutic application except in the limited field of transfusions under very careful safeguards as to purity. (Rowntree—personal communication.) At best the use of anti-coagulants can only be empirical until a reliable check-up test analogous to the blood sugar test as a control in the use of insulin is forthcoming. It seems highly improbable that enough could be used to safeguard an individual having all the factors necessary to pathological thrombosis.

(2) *Stasis due to slowing of the blood stream from mechanical causes, depressed circulation and lowered metabolism.*

Pool[15], Braithwaite[16] and others combat the tendency to stasis of blood in the lower extremities by avoiding so far as possible overextension of legs in the Trendelenburg position, by systematic exercises of the legs while in bed during convalescence, and by the avoidance of tight, compressive dressings. Walters[17] of the Mayo Clinic, following a hint from Dr. Plummer that hyperthyroid cases rarely developed embolism, began in 1927 the systematic use of small doses of thyroid in adult postoperative cases in addition to exercises and frequent changes of position. In a series of 4500 cases so treated he had but four deaths from embolism, all in cases that were poor risks due to advanced age or cardiac disease. Contrasting this incidence of 0.09 per cent with that of the previous ten years reported by Henderson[18] as 0.34 per cent (267 fatal pulmonary emboli after 63,347 operations) it was fair to assume that a very real contribution toward mastery of this troublesome complication had been made. Yet Hosoi claims the same incidence in 22,240 operations at Albany where neither exercises nor thyroid therapy were carried out*. Atanasof[19] reviewed 9,646 postmortem reports for the period 1922-1931, among which he found 33 cases of Basedow's Disease, in six of which death had been due to pulmonary embolism. Pirker in 1929 gave thyroxin to half his cases. Four cases of embolism occurred in the group that did not receive it. In 1930 all patients had it and there were but three cases of embolic death, the first an incarcerated femoral hernia with resection followed by thrombosis of hypogastric and iliac veins from an incisional abscess; the second a case of phlegmonous appendicitis in a 58 year old woman, having large thrombosed varicose veins; the third a 44 year old man with gangrenous appendicitis and general peritonitis.

As no ill effects have been observed and there have been fewer deaths, Pirker continues its use.

(3) *Influence of disease processes, notably cardiovascular conditions.*

I have touched upon a variety of diseases in which thrombosis and embolism are part of the picture. As affecting surgical thromboses the degenerative diseases of the cardiovascular system play an important part. Indeed Kuhn[20] attributes the increase of fatal embolism observed at the Pathological Institute at Freiburg to the prolongation of life by the present-day treatment of chronic heart disease. Rosenthal found in his review, mentioned above, that there had been an increase in cardiac and vascular diseases in Europe from 1919 on, which he attributes to various epidemics, the sufferings of the war period and lack of Vitamin B in the inflation period. Prophylaxis against embolism in these cases rests largely upon the care with which we estimate our surgical risks and the preoperative preparation of such impaired cases.

(4) *Infection.*

That none of the foregoing causes of thrombosis are sufficient of themselves implies the existence of some factor common to all. An infection of more or less specific character, already resident in the host or introduced in some manner by the operation, hypothetically would fill the need. Practically all writers entertain much respect for the rôle of infection, but find objections to it as a cause of those cases of fatal embolism wherein no suppurations are macroscopically evident. De Quervain according to Badgley and Smith[21] found 67 per cent of wound infections in 208 cases of postoperative embolism. In our Worcester series the figures were almost exactly the reverse.

*As his report was based on cases verified by autopsy it is not clear to me that they represented all such deaths in the series.

If in any active operating room one will expose a petrie dish of blood agar near each operation he will be surprised to find that 30-130 colonies develop per hour of exposure. If he will wash the wound with 10 cc. of normal saline after the peritoneum is closed and transfer to appropriate culture media he will find that this precipitation of germs from the air has taken place into the wound as well as into the petrie dish. Most of these wounds, however, do not show gross evidence of suppurative infection. By lysis and phagocytosis these germs are consumed by the local defense mechanism, or are transported to blood and lymph streams to be destroyed or to become manifest elsewhere perhaps as pneumonia, perhaps as a joint infection, perhaps as a thrombophlebitis. It is common experience that thrombophlebitis is accompanied by irregularities of the temperature curves, often inexplicable until a lung infarct, a swollen extremity, or even a massive embolus appears.

So I feel that it is necessary to revise our notions that a wound that heals without macroscopic suppuration is necessarily "clean" and that we must acknowledge that every wound has received a considerable bacterial contamination, whether or not locally manifest, and that such "occult" infections account for certain complications remote from the wound of which the various types of thrombotic processes are examples.

If this theory is tenable, and it surely must be entertained until a better one is at hand, our most obvious prophylactic measure is a definite and persistent refinement of the conditions under which surgeons work and a technique devised to minimize the number and virulence of the bacteria that are allowed to enter and remain in our operative wounds. Fortunately we have in the painstaking technique of the brain surgeons an example which we may well emulate in other fields.

Another paper from the Mayo Clinic which has had less attention than that of Walters but perhaps deserves more, was published by Rosenow[22] in 1927. In it he reports the isolation by a special method of culturing of a diplostreptococcus from emboli recovered from six cases dying from postoperative pulmonary embolism. They were the sole organisms found in three cases and were associated with a hemolytic streptococcus in one, and with B. coli and a staphylococcus in two. The organism grew in short chains, all strains fermented lactose, dextrose and raffinose, two strains also fermented inulin, salicin, and mannite. They were primarily grown in thick glucose-brain-broth and glucose-brain-agar. Sub-cultures grew on blood agar and low columns of broth.

By injecting pure cultures of the organism in rabbits and dogs he produced thromboses and in two dogs pulmonary emboli. From these in turn he recovered the organisms. He says of this work—"The conclusion seemed warranted that the diplostreptococcus isolated from postoperative emboli and thrombi and used experimentally in different animals is the common cause of postoperative and non-operative massive thrombosis and perhaps of closely allied conditions such as infarction of the heart or brain."

Further work on Rosenow's organism is needed. It is to be regretted that agglutination studies were not carried out which perhaps might have afforded us a test of a patient's liability to thrombosis which the world so much needs at present.

All things considered, in the writer's opinion a latent or occult infection activated by a variety of conditions which profoundly alter the metabolism, the circulatory mechanism and the composition of the blood, best answers the requirements of the situation.

In reviewing the literature one gathers the impression that progress is being slowly made toward the goal of more effective prophylaxis through better understanding of the factors which contribute to thrombosis. Studying the cases which form the basis of this paper I gain the impression that while we cannot, under our present lack of a specific preventive wholly eliminate these distressing complications, there is much hope of avoiding the fatal outcome by greater alertness to the premonitory signs of thrombosis in some part of the venous system and the efficient use of such methods of control as are now available.

(1) *Recognition.*

Since it happens now and again that fatal embolism is the first recognized manifestation of such complications prompt detection of a peripheral thrombosis by whatever means we may bring to bear is the key to safety. While a thrombosis may not become locally manifest until it becomes occluding there are many instances in which swelling is present but pain has not yet been sufficiently noticeable for the patient to complain. In detecting these silent types I have found the routine systematic use of the tape measure to be decidedly helpful. It should be used before the patient is allowed to get out of bed, especially if the pulse and temperature curves have been unaccountably irregular. Both legs should be measured at corresponding levels above and below the knee. Careful inquiry as regards pain in foot, calf, thigh or chest and palpation for tenderness at the characteristic locations should supplement this method of observation.

Hematuria, according to Pirker, may be associated with thrombosis of the hypogastric vein,

in which case the pain will be in the buttocks with swelling appearing about the hip and back. In such a case a cystoscopic examination reveals a venous congestion on the corresponding side of the bladder. This picture has not appeared in any of my cases, but may well be listed among the premonitory signs to which one should be alert.

The occurrence of a pain of pleuritic character in the chest should be assumed to be an infarction and precautions instituted, rather than be dismissed as a pleurisy. Such an infarct, often of slight degree, may be the first sign of a thrombosis. Heeded, the warning may save the patient; unheeded, it may mean the loss of a life and an enduring regret to the doctor.

TREATMENT

At Worcester City Hospital, until recently modified by the suggestions of Bancroft and Stanley-Brown as to diet and use of sodium thiosulphate solution, our management of thrombophlebitis has followed the traditional plan laid down by Welch and so forcefully taught by Dr. William L. Richardson in his lectures on obstetrics at Harvard. The guiding principle is rest, not only to the part where the trouble is manifest, but to the entire body. The patient is told that a period of at least six weeks of absolute quiet will be necessary. With cooperative patients one is able to spare their anxieties too much detail as regards the danger of the situation, but with headstrong patients it is advisable to inform them clearly as to the dangers of their situation so that they will realize that their lives are largely in their own hands. Special nursing care is an absolute necessity as the patient should not even reach for a glass of water until a sufficient time has elapsed for the thrombosis to have become anchored by organization. A low residue diet minimizes the use of the bedpan, which is always hazardous, especially with the heavy patients. Massage and rubbing of the extremities are not allowed. As a rule wrapping in cotton is not done. The member is rested on a pillow and pressure of bed clothing is avoided by supporting it with a cage which may carry electric bulbs for maintaining warmth.

During the progress of a case of thrombophlebitis a sudden improvement in the tension, swelling and color of the leg must be regarded with suspicion. It may mean that the occlusion has been relieved by collateral circulation or shrinkage of the clot, but it may also mean that the clot has left its anchorage and is now on its way toward the heart. Redoubled precaution should be the watchword until one is reasonably sure of his ground.

In the event of an embolic crisis, the patient's distress must be met by oxygen and morphine. Sedation is the most useful medical treatment for the critical periods. Sodium thiosulphate is *sub judice* and deserves wider trial. Pleuritic effusions are to be watched for with care and dealt with as indicated. With patience, good nursing and watchful care many embolic cases may be brought safely through.

The following case histories illustrate some of these patients:

Case No. 1—M 38—Came into the hospital with saphenous varicosities and an acute induration on the inner aspect of the thigh. He was kept in bed about 13 days, then the veins were excised without proximal ligation as the initial step. Stitches were removed on the tenth postoperative day. On the thirteenth day his pulse jumped to 110, but dropped in the afternoon, to be up again the next morning. There was also a slight rise of temperature on this day; nevertheless he was allowed to be up in a wheel chair. On the sixteenth day he died suddenly at 6:30 P.M.

Case No. 2—M 58—Operation for bilateral inguinal hernia. Irregular temperature, 98.5-100° daily. Sutures out on the ninth day. Pain in left chest on tenth day with rise of pulse to 110. Sat up in bed on the thirteenth day though still running a moderate temperature. Out of bed on the eighteenth day when a red tender area was noted on right calf with indurated vein. He was not allowed to walk, the leg was elevated and an ice cap applied. On the twenty-second day he had another attack of pain in the chest, on the twenty-third still another and expired in a few moments.

Case No. 3—M 46—Entered with an induration at one side of the anus having been under treatment for hemorrhoids by electrocoagulation. The induration which appeared to be about an unhealed fissure was excised. He ran a normal chart until the tenth day when he had a sharp pain in the right chest with a rise of T. P. R. which rapidly subsided. Two special nurses were assigned and full precautions instituted. On the seventeenth day there appeared friction rubs in the right chest and on the twentieth another sharp attack of pain with rise of pulse and temperature. On the twenty-third day the left leg became swollen and painful. Temperature remained up for ten days, was down for a week and then went up again. Another induration appeared in the ischiorectal region. On the forty-fourth day the other leg became swollen. The induration had now become an abscess, which was opened. From this time on he made a good recovery although hallucinated for about a week. Eventual recovery was complete except for swelling of the legs which has gradually become less and less until now, eighteen months later, it is barely noticeable.

One should hardly conclude a paper upon pulmonary embolism without a word upon the Trendelenburg operation and the few brilliant successes which Kirschner, Meyer, Gintz, Crafoord and Nystrom[23] have achieved. But a single opportunity has come to me (R. A.—1922) to make such an attempt, which was extemporized and naturally failed. Since it has been shown to be possible to rescue a patient from the extremity of an otherwise fatal pulmonary embolism, an obligation is laid upon every hospital to have suitable instruments available and a member of the staff specially qualified. When a case is in imminent danger of a massive embolism a suitable operating room, instruments,

patient, and surgeon should be in such close relationship that the operation can be begun almost instantly.

The difficulties in the way of such a coördination and the possibilities of an error in diagnosis are obvious. A successful operation is likely to remain the rare achievement of a watchful, fearless and capable surgeon. As Nystrom well says, "It is upon prevention that we have to place our hope of being able to defeat at some future time one of the most distressing complications with which, after the victories won by the introduction of antiseptics, surgery has still to wrestle."

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Discussion

Dr. John Homans, Boston, Mass.: *Mr. President and Gentlemen*—There are two sides or two aspects of this matter which Doctor Hunt has brought up, both of which are very mysterious. One is that type of embolism which occurs from sources unsuspected. It is perfectly true, in connection with the operative field, that when a vein is tied the thrombosis will pass from that point until a good current is met, which may mean a considerable or a very short distance; but if a vein is tied very close to the entrance to another vein, there is almost no thrombosis at all. The latter sort of ligation offers perhaps the best chance of avoiding the detachment of an embolus.

However, it is impossible to know when one is opening the abdomen or any part of the body, exactly where the veins which are occluded are going to meet a good current. I feel myself that so far as the very common embolisms which occur from operations of almost any sort, generally pelvic, without the appearance of the so-called thrombophlebitis of the leg, are concerned, there is almost no way of preventing them save endeavoring to tie veins close to their entrance into other vessels and by doing the least possible injury to the tissues in general. Infection seems to have little to do with these accidents.

The second type results from the deep thrombophlebitis, the so-called milk leg. This sort of phlebitis, which necessarily causes the swelling of the leg, is likely, I agree, to be related to infection. I don't see most of these latter cases as postoperative problems at all. They occur under all sorts of conditions. The most interesting I have seen have occurred without any apparent reason at all. I have believed that the source of all such processes was an infection having its origin in the lower part of the body; the rectum, prostate, female generative organs or legs, and inasmuch as all those septic processes must be drained into the pelvis, and so far as the course through the lymphatics is concerned, must pass through the lymph-vessels and nodes surrounding the great iliac blood vessels, they involve the walls of those blood vessels, causing thrombosis in the veins. That, I believe, is the reason why thromboses occurred in the leg in preference to the arm.

It has been proved to my satisfaction, however, that there is more than one sort of process which causes that particular lesion. I believe that it can occur secondarily to a general thrombosis of the entire lower leg or that it can be an almost localized process, a local thrombophlebitis in the pelvis. I don't think all such cases are so very important from the point of view of embolism. Indeed, among those in which I have explored the pelvis, as I have done in three cases, I have found very solid clots firmly fixed in the veins, and in one case limited by the point at which the external iliac vein passed under the hypogastric artery. In

such instances as these there seemed no possibility of anything being detached.

I have found two cases which are particularly interesting. In one, there was a violent exudation about both the artery and vein, evidently a deep lymphangitis; and another was attended by coagulation in the lymphatics winding about the artery and vein without any violent exudation whatever; so that the lymph-stasis and inflammation of the lymphatics, whether or not due to infection, is of primary importance, and for purposes of future study, I think it will be more interesting to devote ourselves to sources of infection carried by the lymphatics from the legs or pelvis, than to the study of coagulation in the veins themselves.

That really is not quite addressing myself to the subject in hand, but to a by-product of it.

DR. ALLEN G. RICE, Springfield, Mass.: *Mr. President and Members*—This distressing condition which occurs we unfortunately cannot explain. A recent statistical survey showed that it occurred fully as often in the straight medical, unoperated cases as in the surgical cases.

It is difficult for me to believe that any one cause that has been mentioned will account for all the cases. I believe they all have something to do with it.

So far as infection goes, it has seemed to me that the possible source of infection could well be something unrelated to the operative field and in some other part of the body, which the patient had before he came into the hospital to be operated on. It doesn't seem to me you can explain it in the unoperated cases in any other way, and the same is true of trauma, and I suppose by "trauma" is meant the operative trauma. The unoperated medical cases that have no trauma still develop this condition.

The causative factor which most appeals to me is the stasis of the circulation, and by "circulation" I mean to include lymphatic.

One recent case that we have had makes me feel that this condition may be a very acute affair. This man had a simple appendix operation. He was going along perfectly well and on the tenth postoperative day suddenly had a severe pain in his right groin. The leg became cold, pale, then mottled. His pain persisted, requiring several doses of morphine. No pulsation could be felt anywhere in the leg below Scarpa's triangle. We naturally felt that he had had his embolus and plugged his femoral artery. We even had gone so far as to make arrangements to take out the embolus, if we could. Fortunately, we had to delay an hour or two in getting the proper materials, and so forth. Much to our surprise, we found after two hours that the man's leg was warm again. We could feel his pulsation down to the dorsalis pedis and he developed a typical phlebitis.

Thank you!

DR. JAMES W. SEVER, Boston, Mass.: I should like very much to show two or three slides of traumatic thrombosis and another case of infectious thrombosis, following osteomyelitis.

(Slide.) There is a case following a fracture with injury to the vein and injury to the artery; a color photograph taken of the leg. It resulted in an amputation. That was not a complete severance of the artery but a definite traumatic thrombosis in the artery itself which was impossible to relieve.

(Slide.) This shows a case which was operated on at the Children's Hospital, a very sick child with osteomyelitis of the upper end of the femur, and, following our usual custom there, the wound was opened, packed and treated by the modified Orr method with a plaster spica. I noticed on a visit four or five days later that the toes were nearly black, and I asked to have the cast immediately cut off. We then found this depression at this point which made me wonder whether perhaps it was a cast pressure which had given the condition, or whether it was a thrombosis secondary to the infection which, fortunately, we don't see very often, but which, of course, as Dr. Hunt has pointed out, might well occur, and Dr. Homans has suggested it.

(Slide.) Another picture which shows the condition of the leg and foot a few days later.

(Slide.) Again a few days later with complete gangrene of the toes.

(Slide.) This shows the bottom of the foot and leg on which I eventually did a guillotine amputation, at about three inches below the knee, not doing the Gritti-Stokes in a child, and leaving as much of the tibial stump as I could. Eventually the child obtained a perfectly good stump. Examination showed a thrombosis of the arteries evidently secondary to the blood stream infection.

DR. JOHN HOMANS, Boston, Mass.: When I spoke of infection and, I think, when Dr. Hunt speaks of infection in connection with these thrombophlebitic processes, I referred to a non-suppurative affair, which has nothing to do with an infected wound. I think that frank, outspoken infections have very little to do with these conditions of thrombosis and embolism, and they are much more, as I see them, some sort of non-suppurative affairs, such as Dr. Hunt has already suggested.

DR. ERNEST L. HUNT: Dr. Cheever asked me how long we kept the patients with thrombophlebitis quiet. We say forty-two days is the minimum and, if they go on with repeated manifestations, we try to have them quiet until they have had normal temperature for two weeks before we get them up at all.

Dr. Homans has clarified a point which I meant to do. There are a good many manifes-

tations of infection besides frank suppuration and I am also convinced that there are a good many infections, which might under certain conditions become frank suppurations, become manifest in other ways of which thrombosis is one.

I have referred to such infections as occult. We all know that we carry a good many infections in our bodies which are not manifest until something like exposure to cold or trauma or something else brings them into action. Thrombosis of the acute type coming on almost immediately after operation was illustrated in the case of a woman with a tuberculous kidney upon whom I did a nephrectomy a short time ago. I came into the ward the morning after the operation and the story was that the patient had had a severe pain in her legs from midnight on. I found her right leg greatly swollen. I feel sure that thing was started before the operation from the infective condition that existed. Under precautions the case got along all right.

The thrombus which forms at a junction point and waves in the blood stream but as yet is not occluding, is the thing we don't detect, as a rule, until an embolism occurs, because the occlusion is not complete. I believe that my system of measuring the postlaparotomy patient's legs carefully before letting her get out of bed will detect some of the partial occlusions and give us a warning whereby we may take precautions to safeguard the patient.

I think that Dr. Homans' work on the lymphangitic accompaniment of a thrombophlebitis is very valuable and a distinct step in advance.

In regard to the fact that there are infections which are not manifest, I wish to speak of something which is more or less a hobby with me and doesn't often get much attention when I mention it. That is the matter of air-borne infection.

We have gotten along so wonderfully well for a generation by following Pasteur's suggestion that we clean up the things which come in contact with the patient and forget the air, that we have been somewhat blind, I think, to changing conditions. In our tremendously congested communities, our surgeries that are not very high above the ground are not clean with regard to the air.

As a proof of that, this plate was exposed during the progress of an operation lasting an hour. As you will see the area of the plate is not nearly so great as is that of an ordinary abdominal incision when retractors broaden it transversely. If you will look at the plate, you will see that it is spattered with colonies and you will see up in one side a colony showing a zone of hemolysis around it. There are all three types of common pus-causing germs, staphylococci, and if the air is so full of these germs, there may be a good many others we are not so familiar with.

I should like to pass the plate around, as you may like to see it. You will probably all say, "He works in a very dirty surgery", and now I will just challenge any of you to go back home and do the same thing in your own surgery, and I should like very much to have you write me the results.

I have checked it up on one occasion on a visit to Philadelphia. There was a beautiful amphitheatre in the old Philadelphia Hospital and Dr. Lee kindly permitted me to make that little experiment during the progress of a hysterectomy and the next morning there were 130 colonies on the plate. Dr. Lee wrote me afterwards asking the result. When I wrote him I asked if he would mind telling me about the patient. He replied that she made a good recovery up to the twenty-first day, then died of pulmonary embolism! On the same day that I made the experiment at the Philadelphia Hospital I went from there to the Pennsylvania Hospital which is on an elevation and the operating room is on the fifth floor. In this instance the culture gave only 30 colonies. On the roof of the laboratory at Worcester City Hospital by a similar exposure I got only eight or ten colonies and those mostly moulds. So it is clear that elevation is a safeguard to a very considerable extent.

I think the next step in the protection of the surgical patient is air conditioning of some type, because air-borne infection is a definite thing. It may be that there is an irreducible minimum, but until we have taken the step of air conditioning, we have not adequately protected ourselves and our patients.

THE NECESSITY OF TREATING RHEUMATISM IN DIMINISHING HEART DISEASE

Dr. Irving R. Roth, member of the Health Committee of the New York Tuberculosis and Health Association, and Chief of the Cardiac Clinics for adults and children at Mount Sinai Hospital, recommends that an organized national campaign be undertaken against rheumatism such as is now being carried on against tuberculosis.

Dr. Roth's recommendations include more adequate hospitalization of patients during the acute phase of rheumatic fever, and readjustment of the facilities of convalescent homes for heart patients to allow for the inclusion of protracted cases. He believes that the primary movement designed to reduce the incidence of heart disease will have to be concentrated on rheumatism. His report bears out the general conception of the problems involved.

VERMONT STATE MEDICAL SOCIETY

CARCINOMA OF THE RECTUM*

BY RICHARD B. CATTELL, M.D.†

MALIGNANT lesions of the large intestine are frequent. If they are suspected by the first physician whom the patient consults, the majority of these growths can be submitted to radical resection with a reasonable expectation of complete eradication of the disease. A comprehensive discussion of this subject is not possible in a brief presentation. At a previous meeting of this Society, Dr. Lahey presented operative plans of management for carcinoma of the colon and rectum. For this reason I shall limit my remarks chiefly to the diagnosis and

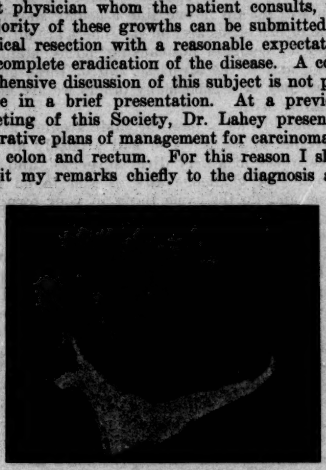

FIG. I. Illustrating the end colostomy established through a stab wound. The midline abdominal incision is well healed. This picture was taken three years after abdominoperineal resection of the rectum for a Grade II carcinoma. This man was thirty-two years of age and had had symptoms of one year's duration. There is no evidence of recurrence.

to the results of treatment of carcinoma of the rectum and sigmoid based on a series of two hundred and seventy patients with carcinoma of the large intestine who have been operated upon at the Lahey Clinic since 1920.

The rectum is the most common site of the carcinomata in the large intestine. In our series one hundred and forty-four patients, or fifty-three per cent, were located in the rectosigmoid and rectum. An additional fifty-eight cases, or twenty-two per cent, were present in the sigmoid colon. Thus, in our experience, seventy-five per cent of these lesions are located in the sigmoid or rectum.

The incidence in the two sexes is about equal. In the entire series forty-four per cent were found in males, while fifty-six per cent were found in females. On the other hand, lesions of the colon were a little more frequent in women, while lesions of the rectum were slightly more frequent in men. A consideration of the sex incidence is of no importance from the standpoint of diagnosis. The age distribution is similar to that of cancer in other parts of the body. Eighty per cent of the cases occurred between forty and seventy years of age. We would like to call attention to the fact, however, that two per cent of our cases occurred under thirty years of age, while seven per cent occurred in the fourth decade. The occurrence of a considerable number of these lesions in young adults is not sufficiently well appreciated, and we feel that patients of any age with suggestive symptoms should be looked over carefully for possible lesions in the large intestine.

Unfortunately a considerable portion of the large intestine is in a position where direct examination is of little value. The rectum for

FIG. II. Photograph of the end colostomy and the recently healed abdominal wound taken but four weeks after abdominoperineal resection of the rectum. This patient was forty-two years of age and had had symptoms for nine months.

a distance of three to four inches can of course be reached by the examining finger. Since fifty-three per cent of our cases occurred in the rectum a discovery of these lesions should be easy with a routine physical examination. Because of the inaccessibility of a considerable portion of the colon we must have something else to call our attention to these lesions during the early stages. Without question the most important thing for the early diagnosis of this condition is a careful consideration of the patient's early symptoms. All of us are too familiar with the later symptoms, such as great weight loss, anemia, large tumors in the abdomen, pain, distention, and the associated obstruction. These easily recognized symptoms unfortunately are those frequently indicating a spread of the disease beyond the primary site in the bowel so

*From the Lahey Clinic.

Read at the annual meeting of the Vermont State Medical Society, Burlington, Vermont, October 6, 1932.

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that there is little hope of surgical removal. There are but few symptoms necessary in order to make us suspicious of a possible growth in the large bowel. The most important symptom is some change in the bowel habit. Constipation is, of course, a common complaint, but when this occurs in an adult who has previously been well with a somewhat sudden or progressive onset one must be suspicious of it. The classical symptom of constipation alternating with diarrhea is an infrequent finding, only about one in five of our cases showing this. A diminution in the caliber of the stool is a later symptom and usually indicates a lesion in the sigmoid. The presence of blood is very important, particularly if it is a persistent finding. The blood is rarely of bright red color as it is when due to hemorrhoids. A persistence of blood associated with mucus in the form of a rather foul discharge is a late symptom and is associated with the larger ulcerative lesions, particularly in the cecum and rectum. Pain is not a common early finding. Abdominal discomfort or distress is much more frequent. Pain is usually associated with either obstruction or extension of the growth to the bone or adjacent structures. The appetite is usually normal in the early cases, which helps to distinguish it from lesions high in the gastro-intestinal tract when distaste for food is an early finding. I do not wish to discuss the late symptoms associated with the cachexia of cancer but in reviewing these early symptoms I wish particularly to emphasize the importance of change in bowel function. If such patients are submitted to a proper physical examination and clinical and laboratory diagnostic procedures, it will result in a much earlier recognition of these lesions.

The abdominal examination of these patients yields little assistance in the diagnosis of them when they are early. Rarely is there a mass palpable in the sigmoid region, as the lesions in this area are usually of an annular constricting type without the production of a large mass. The rectal examination is of the greatest importance. This should of course be a routine part of every physical examination but it is particularly important in these cases. I am sure there is a tendency in doing the rectal examination to introduce the finger but a short distance, encountering the uterine cervix in the female and the prostate in the male. This is not sufficient to demonstrate lesions of the rectosigmoid and high rectum. The patient should be examined in more than one position. The knee-chest position permits a wide spread of the buttocks allowing a higher palpation in the rectal segment. This, however, allows the rectosigmoid and pelvic colon to fall away from the examining finger. Examination with the patient in the lithotomy position on the usual examining table permits examination of a limited segment of the rectum only, although the rectosigmoid can sometimes be pushed down with the patient straining and at times a mass in this position may be reached that could not otherwise be felt. Rectal examination in the common position for examining the prostate with the patient leaning over a chair or examining

FIG. III. The perineal wound of the patient shown in Figure II, which demonstrates complete healing at the end of four weeks.

table probably permits the most extensive examination. The manner of doing a rectal examination may seem to be of little importance yet we have on several occasions been able to discover a lesion of the rectum that had previously been missed by a less careful examination.

Where the lesion is within reach of the examining finger there are few lesions which can be confused with cancer of the rectum. The typical lesion has raised, indurated edges with a crater in the center. The earliest extension of the lesion occurs laterally in the mucous membrane so that usually only a small segment of the rectum is involved. Some idea of the operability of the lesion can be determined by noting its size and the presence or absence of fixation. However, we do not believe that operability can be decided upon except by careful abdominal exploration.

The proctoscope is of great value in demonstrating lesions in the sigmoid and rectosigmoid which are beyond the reach of the examining finger. Proctoscopic examination can, with experience, be done without great discomfort. The view is improved by a preliminary cleansing enema. Care should be used not to employ force in introducing the proctoscope. Particular care should be exercised when the instrument is directed in the region of the lesion. If force is necessary to get exposure the examination should be discontinued. Through the proctoscope, benign polypi and ulcerative lesions can usually readily be demonstrated. The appearance of ulcerative lesions enables one to differentiate carcinoma of the bowel and ulcerative colitis with which it may be confused.

We have found the removal of specimens from the rectum to be of little diagnostic value. Formerly we tried to remove specimens in those cases readily reached by the anoscope or proctoscope but found that not only was it frequently difficult but that we sometimes had reports from the pathologist which conflicted with our clinical diagnosis. The reason for this is obvious, because one is careful not to penetrate the wall in the removal of a biopsy specimen. A superficial portion of the lesion is usually removed and sent to the pathologist and he quite correctly calls the tissue submitted "an infected polyp", "benign polyp" or "no evidence of malignancy", although there may be a definite carcinomatous base below the area removed. Where a positive report of cancer is returned by the pathologist it is of great value, but a negative report is very apt to be misleading. A routine Wassermann is probably advisable although luetic lesions in the large intestine are rarely encountered.

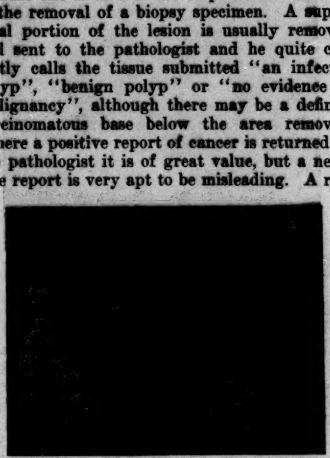

FIG. IV. A "double barrel" or loop colostomy done as a preliminary to a posterior resection of the rectum. Note that although the bowel is completely divided no skin separates the two loops so that both may be easily covered by the ring of the colostomy belt. This patient was fifty-eight years of age, obese, and a poor risk for abdominoperineal resection. Posterior resection was elected for these reasons.

The use of the opaque enema is of little value in demonstrating lesions in the rectum whereas it is of the greatest importance in the diagnosis of lesions in the colon. In the rectosigmoid and sigmoid, filling defects can frequently be demonstrated or where partial obstruction is present a delay may be noticed in passing a given point or the mixture may be entirely halted. In a few instances in our experience we have had considerable trouble in demonstrating a lesion in the redundant portion of the sigmoid. In one patient it was necessary to give three enemata at intervals before the lesion could be seen. This area could not be reached with a proctoscope. This is due to the position of the sigmoid behind the rectosigmoid so that a superimposed view is obtained. By careful fluoroscopy in both the oblique and anteroposterior positions these lesions can usually be demonstrated in this position. Barium by mouth is of no value. The only patients, in whom this would be of help from the standpoint of diagnosis, are those in whom it would actually do considerable harm, that is in those patients with obstruction present. It is dangerous too, in patients with partial obstruction since they may become totally obstructed as a result of this added material in the colon. It is important in all of these patients to give the barium enema first.

Most of the patients coming to us had had symptoms for a considerable time. It must be realized too, that these lesions are probably present for some weeks before noticeable symptoms are produced. Only fifty-four, or twenty per cent of our patients had had symptoms of but three months' duration, while forty per cent had had symptoms for six months or under. Thirty per cent of our patients had had symptoms over one year. In spite of this duration of symptoms over half, or fifty-seven per cent, of the entire group were operable. That is, this number could be submitted to radical resection, since they did not have evidences of metastases in the liver or retroperitoneal glands. The operability was higher in patients between forty and sixty (62.5%) while in young adults in only forty per cent was the lesion sufficiently localized for removal. The early spread of cancer in young adults is similar to that of cancer in other parts of the body. The site of lesions in the large intestine is a definite factor in operability; whereas only forty per cent of the cecal lesions are operable, sixty per cent of the lesions of the sigmoid and rectum were removable.

Although the operative management of these cases is not to be presented I should like to speak of the patients' reaction to colostomy and present our care of these cases. We feel that every patient with carcinoma of the rectum, which is operable, should have a permanent colostomy. I am sure that the usual reaction of the patient is to immediately refuse an operation which necessitates having their bowels move on the abdominal wall. It, therefore, becomes very important to overcome this objection and having done so we must help them care for their colostomy and instruct them in some proper management. Some of the members of this Society have asked me to present the method which we use so that I am including the instructions which we give as a printed form to each of our colostomy patients, together with the diet which enables them to care for it properly.

Instructions for Colostomy Patients

A colostomy need not be a nuisance or as unpleasant as is commonly believed at first thought. With proper care the bowels can be regulated so that there is no offensive odor about the patient's

body or clothing and they can be satisfactorily controlled to move at a convenient time. The following instructions have been worked out to make the care of the colostomy as easy as possible. In order to make the bowels move infrequently with a semi-solid stool it is necessary to regulate the diet as well as to take enemata through the colostomy. It is particularly important to realize that where colostomy is present, constipation is to be desired and a bowel movement only every third day does not interfere with health.

The following equipment is necessary for this, and is quite simple to handle. A two quart enema can, four feet of connecting hose with a shut off, a glass adapter and a 22 or 26 French catheter. Warm water from the faucet can be used for the irrigation. The irrigation should be taken every third morning or every third evening as desired by the patient, but the evening is recommended. It requires one half to three quarters of an hour to carry it out adequately. It is done as follows:

The enema can with two quarts of warm water can be fastened about four feet above the floor. The patient can either sit or stand. The catheter is greased and inserted for a distance of at least six inches or as far as it can be passed without discomfort. It is then connected up and the water allowed to flow at a speed consistent with comfort. This can be regulated by adjusting the shut off as a too rapid flow of water will cause distention of the bowel and will produce pain and distress. After the bowel feels quite full if the fluid has not already begun to flow from the colostomy the catheter may be removed and the bowel can be evacuated. A large deep pan or pail is immediately firmly pressed against the abdominal wall below the colostomy and held obliquely so that even with forcible dejection all water and fecal matter is caught in the vessel. If necessary, irrigation can be repeated two or three times, following which the patient can remain for some minutes until the fluid return stops.

Be sure you are properly instructed by the nurse for doing these irrigations before leaving the hospital. If this method is used it is frequently unnecessary to wear a colostomy belt but the colostomy can be covered with small gauze pads. Sometimes it is necessary to wear the belt in the morning until all of the fluid which remains in the bowel has been discharged. The irrigations in the individual patients will have to be modified depending on circumstances. Each patient should be provided with a proper belt before leaving the hospital, but the decision about the time it should be worn can be worked out later.

The diet must be regulated and a low residue, constipating diet should be used such as the one attached. It will be found that no cathartics, laxatives or oil will need to be used.

A great number of people find it necessary to adjust themselves to the presence of a colostomy and it will be encouraging to know that many people continue manual labor, office work, and various professional activities with a colostomy present with little inconvenience.

Diet for Colostomy Patients

In order to control bowel movements properly under the accompanying management it is necessary to begin with a strict diet and gradually increase it to a more common one. At first it is best to limit the diet as follows:

Breakfast

Large portion of cream of wheat with boiled milk, sugar if desired; two hard boiled eggs; dry toast; one glass of boiled milk.

Lunch

Creamed soups (creamed lettuce soup three or four times a week); creamed fish or meat; baked or mashed potato; boiled rice or custard.

Dinner

Meat or fish, creamed whenever possible; escalloped vegetable—no spinach or carrots; soft pudding, custard or junket.

Later as the stools become more solid a more liberal diet may be allowed:

Cream of wheat, puffed wheat, or puffed rice.
Eggs; boiled, poached, baked or scrambled.
Oven broiled bacon.
White bread, plain or toasted.
Plain white crackers or saltines.
Butter, cheese, milk, tea, coffee, cocoa.
Boiled rice. Baked macaroni or spaghetti.
Baked custards.
Soups of all kinds except tomato or corn.
Potato; baked, mashed or riced.
Roast beef, lamb or chicken.
Broiled steak or lamb chop.
Fish, broiled, boiled, creamed.
Sponge or angel cake.

FIG. V. The sacral wound of the posterior resection of the patient in Figure IV, four months after operation. The coccyx had been excised.

If stools are satisfactory on above diet the following may be added.

Raw lettuce and celery.
Cooked string beans, peas, carrots, beets, winter squash, cauliflower, asparagus.

It may be possible to add:

Cooked fruits.
Strained orange juice diluted with equal quantity of water.

In a ten-year period previous to 1931 we operated upon one hundred and ninety-six patients with carcinoma of the large intestine, one hundred and six of whom were submitted to radical resection. In this group there were thirty-eight deaths, or a mortality of thirty-six per cent. This is a high operative mortality and if true now would be a definite deterrent to operation in many of these cases. The operative mortality in this group, however, was largely due to the employment of immediate resection with suture in the colon cases and to the employment of the one-stage abdominoperineal resection of the rectum for lesions below the sigmoid. At a former meeting of this Society Dr. Lahey described our present operative plan of management for both the colon and rectal le-

sions. For this discussion it is sufficient to say that we now employ the Mikulicz type of resection for lesions in the colon and redundant portion of the sigmoid and a two-stage abdominoperineal resection of the rectum in place of the old one-stage or Miles' operation. The operation we use for cancer of the rectum we term the Lahey type of resection in order to distinguish it from the previous modification of the Miles' plan. Since January, 1931, we have operated upon seventy-four patients, forty-two of whom have been submitted to radical resection. There have been two deaths in this group, an operative mortality of 4.8 per

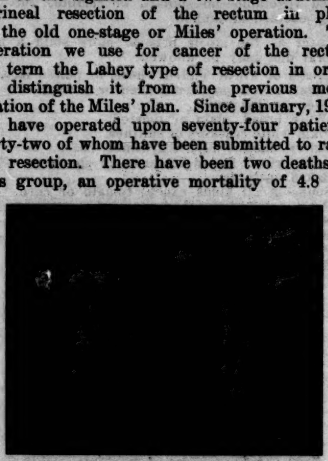

FIG. VI. Illustrating a common type of colostomy belt which is efficient. This is shown in place on the patient with a "double barrel" colostomy shown in Figure IV.

cent. A consideration of these figures shows very clearly a striking reduction in the operative mortality, from 36 per cent to 4.8 per cent, and we believe this to be almost wholly due to the change in operative management, previously described.

In a consideration of the end results in this group of two hundred and seventy patients only a small proportion have been followed over five years. Of the group of cases done over four years ago forty-seven per cent of the patients with carcinoma of the colon surviving operation were alive and without evidence of recurrence, while forty-two per cent of the patients with carcinoma of the rectum showed no evidence of recurrence. No patient in the group that we have followed has recurred after four years have elapsed.

In conclusion I should like to again emphasize the importance of paying attention to the early symptoms caused by carcinoma of the large intestine, so that these patients can be submitted to careful clinical study. Patients in whom a colostomy is necessary should be instructed in its proper care and management. With the present operative management these patients can be operated upon with a low operative mortality; 4.8 per cent during the past two years. With the earlier discovery of these lesions, more can be submitted to radical resections with an increasing number of patients that will be cured.

MISCELLANY

VERMONT DEPARTMENT OF PUBLIC HEALTH

JANUARY, 1933

The incidence of communicable diseases reported during the month is shown by the following table: chicken pox 200, diphtheria 11, measles 7, mumps 193, scarlet fever 91, septic sore throat 8, typhoid fever 1, tuberculosis 8, whooping cough 105, and undulant fever 1.

A total of 1,594 examinations was made by the laboratory during the month, classified in the following manner:

Examinations	For Diphtheria Bacilli	226
"	" Widal Reaction of Typhoid Fever	28
"	" Malarial Parasites	0
"	" Tubercle Bacilli	262
"	" Evidence of Syphilis	455
"	" Gonococci in Pus	140
"	Of Water, Chemical and Bacteriological	19
"	" Water, Bacteriological	219
"	" Milk, Market	150
"	" Milk, Submitted for Chemical only	5
"	" Milk, Submitted for Microscopical only	13
"	" Foods	2
"	For the Courts, Autopsies	3
"	" the Courts, Miscellaneous	9
"	Of Animal Heads for evidence of Rabies	1
"	Miscellaneous	62
Autopsies to complete death returns		0

Thirty-nine cases of gonorrhea and twenty-one cases of syphilis were reported to the Venereal Disease Division. Five hundred and two Wassermann outfits and 123 gonorrheal slides were distributed.

The Director of the Division of After-care for Poliomyelitis reports 72 patients seen in January, 71 in their homes. Eighty-nine home visits were made, 51 polio and 38 non-polio. Four patients were admitted to the Audubon Hospital and one patient discharged from this hospital. Fourteen orthopedic corrections were made to shoes. Sales were made by the Vocational Worker of this Division amounting to $56.25.

The Director of the Maternity and Infancy Division visited seven towns, talking to women's clubs, P. T. A. Associations and in the interests of dental clinics.

FEBRUARY, 1933

Communicable diseases reported to this Department during the month of February are listed as follows: chicken pox 216, diphtheria 12, measles

17, mumps 297, scarlet fever 77, typhoid fever 2, smallpox 2, undulant fever 1, whooping cough 86 and tuberculosis 9.

The Laboratory of Hygiene did a total of 1508 examinations during the month, classified in the following manner:

Examinations For Diphtheria Bacilli	338
" " Widal Reaction of Typhoid Fever	22
" " Malarial Parasites	0
" " Tubercle Bacilli	184
" " Evidence of Syphilis	392
" " Gonococci in Pus	116
" Of Water, Chemical and Bacteriological	24
" " Water, Bacteriological	206
" " Milk, Market	79
" " Milk, Submitted for Chemical only	1
" " Milk, Submitted for Microscopical only	38
" " Foods	13
" " Drugs	3
" For the Courts, Autopsies	0
" " the Courts, Miscellaneous	3
" Of Animal Heads for evidence of Rabies	2
" Miscellaneous	84
Autopsies to complete death returns	3

The Division of Venereal Diseases received reports of 20 new cases of gonorrhea and 26 new cases of syphilis. Four hundred and thirty-one Wassermann outfits and 259 gonorrheal slides were distributed.

The nurses of the Division of After-care for Poliomyelitis visited 59 patients, made 59 home visits, and consulted six doctors. Nineteen orthopedic corrections were made to shoes, nine pieces of apparatus were altered or repaired, two patients were admitted and two were discharged from the Children's Hospital in Boston. Two patients were admitted and three discharged from the Audubon Hospital. Sales amounting to $21.00 were made by the vocational worker of this Department.

Nine towns were visited by the State Maternity Nurse in the interest of the Division of Maternity and Infancy, assisting home demonstration agents and home nursing demonstrations. Four hundred and twelve notifications of birth registration have been mailed and 368 pieces of literature distributed.

OBITUARY

DR. MERRITT H. EDDY

On March third the medical profession of New England lost its senior physician, Dr. Merritt H. Eddy.

Not only was he the oldest physician in New England, the oldest graduate of the Medical College of the University of Vermont, but he had the distinction of holding this venerable position among the New England Masons, the Vermont Methodists, the Alumni of Middlebury College, and the Chi Psi Fraternity.

Only six weeks before, on January twenty-fifth, he had celebrated his hundredth birthday. It had been a day of triumph, of reminiscence, of joy such as few men in the medical profession ever have a chance to share. Many physicians of the vicinity, and from more distant points, came to bring their congratulations and to pay their respects.

In the many years of his practice, he had never dreamed he had made so many friends. Remembrances poured in from all sections of the United States, and his letters of congratulations included one from President Hoover.

Tribute was paid him on this day over the radio by "Cheerio" and by Lowell Thomas, and in a special radio message in the afternoon by Dr. J. N. Jenne, Dean of Medicine of the University of Vermont.

Two years ago, when Dr. Eddy was ninety-eight, he was honored by being invited to lay the cornerstone of the New England Medical Center Building in Boston, on which occasion he did a most characteristic thing. He was introduced and handed the shining trowel, but instead of speech-making, he began at once to spread the mortar. There was work to be done and he had to be about it.

The narrative of Dr. Eddy's life would include the records of many others, few of them conspicuous in world events, but the kind of lives that collectively create history. His tale would include much of the history of Northwestern New England, and would bore deeply into the substance on which the greatest Yankee ideals are founded.

One episode of overcoming hardship would but lead to another. From his start on a little farm in Winhall, Vermont, on January 25, 1833, his character was tempered with hardships. At the age of eight he was filling the part of a farm boy of eighteen, helping to grub out a living from Vermont soil behind a plow. His education was sporadic, dependent always on his own earnings. He studied at Black River Academy and Burr and Burton Seminary. He graduated from Middlebury College in 1860 with an A.B. degree and two years later received the Master of Arts from the same institution. In the meantime he had been the Principal of the Ticonderoga Academy at Ticonderoga, New York.

He then attended Harvard Medical College for a year and transferred to the College of Medicine of the University of Vermont, from which he received the degree of Doctor of Medicine in 1865.

After graduation he took up the practice of medicine in Middlebury, Vermont. In 1867, he married Louise M. Seely, sister of Professor Henry M. Seely of Middlebury College. Mrs. Eddy was his unfailing inspiration and help for sixty years.

They celebrated their sixtieth anniversary in 1927 and Mrs. Eddy died that year aged ninety-one years.

Dr. Eddy's life period witnessed more advancement in medicine than all the ages of history up to the time of his birth. Marvelous, indeed, is the progress that has been made, yet he had not only been a witness to this wonderful progress, but a participant as well. He had been a part of it.

He is survived by two other generations of physicians, by his son, Dr. Stanton Seely Eddy, now in Middlebury, and two grandsons, Dr. Stanton Seely Eddy, Jr., at present an interne in the Boston City Hospital, and Maxon Hunter, now studying at Harvard Medical College.

Throughout his whole medical practice, Dr. Eddy was always keen in his interest in human nature, and this interest was dominated by service to others. He had a remarkable gift of gaining confidence by his presence, rather than by the use of many words. Although his home was in a small college community, he served a large surrounding territory. His interest and personality had spread to all parts of the United States through his friends and Alumni of Middlebury College.

Dr. Eddy had an unusual personal interest in the individual, whether as a patient or as someone he might assist. This is attested by the fact that he had probably done more to assist Middlebury undergraduates directly, by giving them wholesome advice and lending them money for college expenses, than any other alumnus.

Dr. Eddy always looked life straight in the face, without fear, determined to make the most of every opportunity. Thinking of his life of a century span, one is almost irresistibly reminded of Milton's great words:

"Nothing is here for tears, nothing to wail
Or knock the breast,. no weakness, no contempt,
Dispraise, or blame, nothing but well and fair
And what may quiet us in a death so noble."

REQUIREMENTS FOR THE LICENSE OF MEDICAL STUDENTS IN NEW YORK STATE*

Requirements of the New York State Education Department for the admission of American or European medical students studying abroad, to New York medical licensing examinations have been announced by Dr. Ernest E. Cole, acting commissioner of education. These requirements are in harmony with regulations recently promulgated by the Federation of State Medical Boards of the United States. The federation has announced that students proposing to study medicine in Europe will be subject to the following regulations for admission to the various state medical licensing examinations:

1. No American student matriculating in a European medical school subsequent to the academic year 1932-1933 will be admitted to any state medical licensing examination or to the examination of the National Board of Medical Examiners, who does not, before beginning such medical study, secure from a state Board of Medical Examiners or other competent state authority a certificate endorsed by the Association of American Medical Colleges or the Council on Medical Education and Hospitals of the American Medical Association showing that he has met the premedical educational requirements prescribed by the aforementioned associations.

2. No student, either American or European, matriculating in a European medical school subsequent to the academic year 1932-1933 will be admitted to any state medical licensing examination, or to the examination of the National Board of Medical Examiners, who does not (a) present satisfactory evidence of premedical education equivalent to the requirements of the Association of American Medical Colleges, and the Council on Medical Education and Hospitals of the American Medical Association, and graduation from a European medical school after a medical course of at least four academic years, and (b) obtain a license to practise medicine in the country in which the medical school from which he is graduated is located.

*Quoted from Science. 77:277 (March 17) 1933.

TYPHOID CARRIERS

A rather important report relating to chronic enteric carriers and their treatment has been outlined in the *New York Times*, issue of March 25. Although the report shows that typhoid fever mortality is not very considerable in Great Britain, concern is felt for the communicability of the disease which is believed to be especially due to carriers rather than to the former sources through drinking water. The supplies of drinking water in Great Britain and the disposal of sewage have been brought to a high degree of excellence. Even though the disease is not particularly prevalent the suggestion is that the necessity for control is especially stressed and particularly the study of carriers because few cases are found except those due to these agents.

In the comparatively few cases where the disease has been studied, the large proportion has been due to infection by the carrier and in several instances a considerable number of people have fallen victims to the contaminated food which has been handled by these persons who harbor the specific germs.

In conclusion, recommendation is made that these contaminated people should be treated by removal of their gall bladders, which treatment has been effective in eliminating this danger in seventy-five per cent of the cases thus operated upon. The usual recommendation is made that all populations should be protected so far as is possible by antienteric vaccination. This is not regarded as generally practicable in modern times, although of course a particularly important procedure where large groups of people are brought in contact with each other.

MEDICAL PROGRESS

PROGRESS IN THE STUDY OF CARDIOVASCULAR DISEASE IN 1931

BY SYLVESTER MC GINN, M.D.,* AND HOWARD B. SPRAGUE, M.D.*

(Continued from page 698, issue of March 30.)

D. ANGINA PECTORIS

Roberts has discussed in an interesting manner the association between the mental characteristics and the nervous make-up of individual patients and angina pectoris. It is noted from various sources that angina pectoris is infrequently seen in the Negro. Suggesting treatment of the patient along the lines of psychotherapy, he writes, "Perhaps when we realize the tremendous power of nervous and mental influences to produce the anginal state as well as the anginal attack, we shall be stimulated to accent the former rather than the latter, and at first at least look for the cause of both in a personality pathology."

Lian has reported on 5 of the 36 cases he has observed of angina pectoris complicated by left thoracobrachial neuralgia. He favors roentgen irradiation of the roots of the brachial and cardiac plexus in the therapy of cervicothoracobrachial neuralgias.

Mandelstamm has studied the autonomic cardiac reflexes in 165 persons with true coronary angina pectoris. Marked cardio-carotid reflexes (Cermak-Hering test) were observed in 62 per cent of all old persons examined but were only present in 2 per cent of young adults. The exaggeration of this reflex in angina pectoris and arteriosclerosis is caused by atheromatosis of the carotid sinus, the cardiac muscle, and perhaps in the autonomic nerves and reflex centers themselves.

White and Bland have presented a clinical study of 500 cases of angina pectoris and of 200 cases of coronary thrombosis. Of the angina pectoris patients about one-fifth had normal hearts so far as could be determined clinically. Two hundred and thirteen cases are now dead with an average duration of life 44 years from the onset of the disease. Death was frequently sudden and 82 per cent of those who died have succumbed to cardiac failure. Of the 200 cases of coronary thrombosis 101 have died, most of them of cardiac failure, with an average duration of life 1.5 years after the first attack.

Wood and his associates have described 30 cases of angina pectoris studied electrocardiographically, fifteen of which showed temporary changes of the ventricular complex during pain. Experimental coronary occlusion produced in dogs and cats sometimes gave temporary electrocardiographic changes. Inasmuch as some cases failed to give changes, this is believed to be evidence that myocardial ischemia is possible in angina pectoris whether or not there is electrocardiographic evidence.

Siegel and Feil observed T wave and S-T interval changes during attacks of angina pectoris in 8 of 11 cases. Similar observations made on patients having other types of pain, such as renal and gallstone colic, failed to show that the T wave differed from that seen before the attack.

Root and Graybiel have reviewed 210 cases of angina pectoris complicating diabetes mellitus and note that the incidence of the former in diabetes is extraordinarily high. The duration of life in angina pectoris is shorter than in a non-diabetic series. There is nearly an equal sex ratio and young adults have it following a long period of diabetes. It is such factors as these that lend credence to the belief that diabetes makes these cases different from the non-diabetic cases. Modern dietary and insulin treatment may have a favorable effect on this relationship.

Palmer illustrates with four cases the observation of referred pain simulating angina pectoris but of gastro-intestinal origin. Relief was obtained by the use of a bland diet and tincture of belladonna.

Caffé and Schwartz discuss a case of auricular fibrillation and attacks of angina pectoris coëxisting for seven years.

Lewis states that there is one form of angina pectoris in which the attacks are associated with a high pulse rate and blood pressure. They occur mostly in males with free aortic regurgitation, occur frequently at night, and are accompanied by flushing, palpitation, and respiratory disturbances. There is no relationship between the level of the pulse rates and pressures and the beginning of pain. The attacks suggest vasoconstriction of the visceral blood vessels, including the coronaries, and are quite susceptible to amyl nitrite.

E. CORONARY DISEASE AND THROMBOSIS

Herrick discusses the coronary artery in health and disease, stating in the beginning that thrombosis in general is on the increase. This may be due to the speed of modern living or to the fact that more people are reaching senescent years, but the greater use of intravenous therapy probably has nothing to do with it. Coronary thrombosis is always due to disease

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of the artery, but other factors such as quantitative and qualitative blood changes that promote venous thrombosis may also precipitate coronary occlusion.

Luten has also discussed the factors contributing to coronary occlusion. He says thrombosis depends on a lesion of the vessel wall. Factors precipitating an occlusion of the diseased coronaries may be: (a) a change in character of the blood such as increased viscosity which is rare, (b) a slowing of the coronary circulation such as is found with lowered diastolic pressure, diminished cardiac output, and coronary constriction by reflex action. Occlusion rarely comes on unusual exertion when the circulation is active but is frequent during sleep when the cardiac output is small. Occlusion occurs so frequently in relation to meals that there may be some kind of gastro-intestinal reflex resulting in constriction of the coronaries. The T wave can be inverted by ingestion of ice water so that possibly the proximity of cold to the cardiac apex may have something to do with it.

Domanig believes that certain conditions such as old age, cardiac and circulatory disturbances, obesity and retardation of the blood flow are factors predisposing to thrombosis. He believes that they should be treated as such and suggests forms of therapy as respiratory exercises, massage, digitalization, and intravenous fluids to fill up the vascular system.

Musser and Barton present the observation that there is a certain group of men having coronary thrombosis who are not past the sixth decade, who do not have general arteriosclerosis or hypertension, but who often give a history of coronary occlusion in other members of the family.

Sigler reports twenty cases of coronary occlusion with the clinical manifestations and electrocardiographic observations. *Levy* calls attention to a distinct group of patients under 50 years of age who have mild forms of coronary occlusion and illustrates the type with 8 cases. Recovery is rapid but it is difficult to make an accurate prognosis as to liability to recurrence. *Shookhoff and Douglas* present an interesting case in which the patient, 35 years old, entered the hospital following nausea, vomiting and substernal pressure. Fluoroscopic and electrocardiographic findings aided in making the diagnosis of aneurysm of the left ventricle following a coronary occlusion a few days earlier.

Moritz has studied six cases in which the stenosis of the coronary arteries was due to syphilitic arteritis of not more than 10 to 12 mm. of the proximal end of the vessel. In some cases there was evidence that the coronary disease was chronic whereas the aortic syphilis was active. In two cases it seemed probable that a collateral circulation had been established inasmuch as the myocardium showed no histologic evidence of infarction. It was considered that patency of the thebesian communications played a rôle in this circulation.

Rabinowitz, Shookhoff, and Douglas have made observations on the sedimentation rates in coronary disease. The sedimentation rate was found to be increased in 10 patients with acute coronary occlusion. None of these patients had an anemia so the technique employed was that of Linzenmeier. Rapid rates were found which lagged behind the elevation of the temperature and rise in white count but persisted after they had subsided. This is believed to be a helpful index in judging the extent of myocardial degeneration.

F. HYPERTENSION

The importance of directing attention to the mental side of patients with hypertension as well as to their blood pressures is emphasized by several writers. A study was made by *Ayman* of 100 patients with hypertension in whom there were symptoms of fatigability, irritability, weakness and dizziness for some time. These could not be differentiated from the symptoms evidenced by patients with psychoneuroses, nor could any organic background be found adequate to explain them. In both groups there was a significant degree of maladjustment to emotional difficulties. This corroborates a previous finding that 82 per cent of the patients received symptomatic relief by simple suggestion. That an earlier diagnosis of essential hypertension can be made and should be made, that suitable therapy may be started at the onset, is pointed out by Ayman in another paper. Consideration of slight elevations in pressure such as 10 mm. above normal, the lability of the pressure, the heredity, and emotional stability may aid in attracting attention to the diagnosis of essential hypertension. The therapy consists in quieting and reëducating the hyperactive personality.

Riesman has reviewed the subject of hypertension with special reference to essential hypertension and its possible etiological factors. He classifies the clinical type as (1) accidental; (2) nephritic; (3) arteriosclerotic; and (4) essential. A few cases are given to illustrate the compatibility of hypertension and longevity. It is noted that old patients bear hypertension better than young persons. A résumé of the commonly used therapeutic measures is given with emphasis toward attaining a better physical and mental hygiene.

Ayman finds wide variations in both the diastolic and systolic blood pressures of individuals with essential hypertension observed in a period up to one and a half years. *Wood* has also found a fluctuation in blood pressures in a group of hypertensive patients.

Pepper believes that the correct differential diagnosis between malignant hypertension and

cerebral tumors should be made and usually can be made if considered.

Patek and Weiss have made various tests and have tried various reflexes on 42 patients with arterial hypertension and on 37 control subjects without any clinical cardiovascular damage, to observe the tone of the sympathetic nervous system. No striking difference exists between the tonus of the automatic nervous system in persons with or without arterial hypertension. There is a tendency for the parasympathetics to react less in hypertensives than do the sympathetics. The skin vessels react more frequently with pressure responses and the following symptoms alone or in combination occur more frequently in cases of arterial hypertension than in controls: overexcitation, absence of sinus arhythmia, negative hippus, negative or reverse oculocardiac reflex and the white dermographic reaction to light and heavy pressure.

G. CARDIOVASCULAR SYPHILIS

The idea that the cardiovascular systems of Negroes are more susceptible to the Spirocheta pallida than are those of Whites, was questioned by *Cason*. He presents data showing that this organism attacks the cardiovascular system about equally in patients having syphilis although the total quantity is greater in the Negro. He advances the explanation from his series, to account for so many Negroes with cardiac pathology, that five times as many Negroes are doing heavy work as compared with the Whites; and lack of knowledge results in delayed medical consultation.

A case of syphilitic heart disease was reported by *Alvarez and Herrmann* having aortic regurgitation, congestive failure and a unique kind of murmur. The latter was explained at postmortem when in addition to syphilitic aortitis an extensive Chiari network was found. *Herrmann* has offered the thesis that the great amount of edema in syphilitic patients may be the result of the massive albuminuria in syphilitic nephritis which reduced the serum proteins.

H. MISCELLANEOUS

Ginsberg has reviewed the development of our present concepts as to the association of cardiac conditions and hyperthyroidism. *Vanden Berg* considers cardiac overaction the most helpful sign suggesting the presence of thyroid dysfunction. Its presence is important before the general symptoms of hyperthyroidism are obvious and indicates remaining toxicity after operation.

Hurxthal has found that the blood pressure readings taken under basal conditions are lower than those otherwise taken, the difference being most marked in cases of hyperthyroidism. The pulse pressure is increased in hyperthyroidism and is decreased in about 50 per cent of the patients following relief of thyroid toxicity but there is no constant relationship between the blood pressures and the basal metabolic rates. The average basal blood pressure readings in cases of toxic goiter after operation and in cases of nontoxic goiter before operation are parallel. The average basal blood pressure reading after relief from hyperthyroidism in exophthalmic goiter and from toxic adenomatous goiter is approximately the same up until 50 years of age, but thereafter it is slightly higher in the latter group. The blood pressure in hypertension complicated by hyperthyroidism undergoes, on an average, the same changes that patients with hyperthyroidism but without hypertension undergo following operation. From this study it is concluded that there is no evidence that hyperthyroidism leads to permanent cardiovascular hypertensive disease.

Morris states that there are some cases that show improvement of their cardiac condition after thyroidectomy although their basal metabolic rate has not been elevated. He presents two cases of adenoma and one of substernal thyroid. The former should be removed to prevent cardiac disease.

Christian prefers to classify that large group of cardiac cases having no valvular pathology as chronic non-valvular disease. It may be modified by using the terms hyperthyroid, hypertensive, or similar conditions when they are present. When symptoms are present, he advises the daily administration of digitalis along with the usual measures of rest, gradual reduction of weight, etc.

Seng has reviewed a series of 514 cases of prostatism of which 454 were successfully prostatectomized. Sixty patients died, 36 of the deaths following prostatectomy. The causes of death were attributed to some cardiovascular lesion in nearly 50 per cent of the cases, next in order of frequency being pulmonary and renal disorders and infections.

He concludes that:

1. The man with *normal blood pressure* (140-160) is the ideal surgical risk in prostatectomy and heals readily. In this group, there were 21 deaths and 174 successfully prostatectomized.
2. The man with *low blood pressure* is not as good a risk and heals sluggishly, frequently having a cardiovascular breakdown and so requiring the simplest procedures. In this group there were 20 deaths and 152 cases with successful prostatectomies.
3. The man with *high blood pressure* (160 and over) is the least favorable risk and is liable to cardiac, pulmonary and renal lesions. There were 19 deaths in this group of patients with 128 successful prostatectomies performed.

Thomas and his associates have studied the necropsy material of 33 patients with hypertrophy of the prostate. Cardiovascular disease

without urinary infection they found to be a factor in producing death in only 7 per cent.

Swan and Mintz have reviewed 170 cases of prostatectomies for benign prostatic hypertrophy and have compared them with a previous group of 250 similar cases operated on the same hospital service. The first group consisted of cases between 1926-1930 inclusive and had a mortality rate of 5.8 per cent whereas the latter group was prior to 1922 and had a mortality of 18.5 per cent. It is felt that a part of this reduction is due to a routine cardiac consultation with an electrocardiogram and teleoroentgenogram available. Of the 170 cases, ten died and it was found that seven of these had had high blood pressures. Six of them died of circulatory causes. No type of anesthesia was found preferable to any other, but the choice should depend upon the individual case.

Stewart has reviewed 40 cardiac cases with prostatic obstruction and frequently found cardiac arhythmias and an unusually advanced type of general and coronary sclerosis. He has observed that there has been a decided beneficial effect to the cardiac system in a few cases where constant bladder drainage was instituted.

Richter has made a two year survey of the incidence and variety of heart disease among the school children of San Francisco. Her group has found that congenital heart disease and rheumatic valvulitis were not uncommon. About 2 per cent of the school population have been reported by the school physicians as being cardiac suspects. Of a group of 319 cases of organic heart disease, the condition was of congenital origin in 140, rheumatic in 151 and infectious, other than rheumatic, in 281. The manifestations of rheumatic fever are less dramatic and more insidious than is generally seen but it produces more physical disability than congenital heart disease. *Hughes and Yusuf* report seeing an occasional case of rheumatic heart disease in the Punjab. *Allen* found that in a group of 1000 Negro male factory workers in Cincinnati, 55.6 per cent had some significant cardiovascular abnormality as compared with 33.5 per cent of the Whites. Hypertension and myocardial hypertrophy predominated in these observations. Men that were overweight or who had positive Wassermann reactions were more prone to hypertension.

VI. Symptoms and Signs

Bedford and Treadgold believe that location of the apex by palpation is the most reliable clinical method of measuring the heart and that orthodiagraphy is the most accurate roentgenological method. Both body weight and height must be correlated with the transverse diameter measurement in determining the normal size of the heart for an individual. *Moritz* concludes that orthodiagraphy is the most satisfactory way to measure the size of the heart and that to determine whether or not it is normal, the body weight is the best correlative.

Willius has made a study of 700 patients of 75 years and older in reference to the cardiovascular system. There were five men to one woman and 315 had no clinical evidence of heart disease as opposed to 385 or 55 per cent who did have clinical evidence of heart disease. The systolic blood pressure was 140 mm. of mercury or above in 70.3 per cent of the patients, but only 9.7 per cent had pressures over 200. The diastolic pressures were over 110 in 20.7 per cent of the patients.

In a comprehensive paper *Wiggers* has discussed the most common cardiac symptoms and has explained them on a physiological basis.

Ganter recently called the attention of physicians to the importance of bone transmission of sound in the diagnosis of diseases of the heart. *Pisani* was unable to confirm Ganter's observations as to the significance of such transmission largely because the mitral and not the aortic murmurs are best transmitted and because there seemed to be no relation between the hypertension and the extent of bone transmission. *Hamburger* has presented some examples of cephalic murmurs that originate from intracranial, extracranial or infracranial sources with the purpose of reviving interest in cephalic auscultation.

Schwartz and Biloon give the histories of three patients in whom the clinical diagnosis of an occluding thrombus of the left auricle was suspected in life and later proved at postmortem examination. Two of the patients had mitral stenosis and regurgitation, one had hypertension, but all had auricular fibrillation with a rapid ventricular rate. The diagnosis was made on the clinical appearance of peripheral vascular disturbances, sudden and transitory in one and progressing to gangrene of the extremities of the other two.

Christian states that, as a rule, stenosis of the aortic valve gives a long period of physical signs without symptoms while with aortic insufficiency physical signs do not greatly precede the development of symptoms. In both conditions when congestive failure does occur, it is apt to usher in a fairly rapid downhill course to a fatal issue. It is thought that the myocardium is damaged less in processes involving the aortic valve than when other valves are involved. For instance, in rheumatic mitral stenosis cardiac insufficiency may come on in a relatively short time, ten to fifteen years, but rheumatic aortic stenosis may persist for many years without evidence of cardiac insufficiency.

Wiggers has given his opinion that in disease of the aortic valve both the magnitude of the regurgitation and its distribution during successive phases of diastole are determined by the size of the leak. In cases where the insufficiency

is not great, regurgitation predominates during the latter phases of diastole; where the reflux is great it happens chiefly during the initial period of relaxation.

Seven patients having progressive muscular dystrophy were examined by *Boas and Lowenburg* by means of a cardiotachometer. All showed a tachycardia which persisted during sleep. They believe this to be the result of the characteristic myocardial lesions of this disease and the effect of the loss of the pumping action of the striated muscles on the venous return flow.

A comparison was made by *Stewart and Moore* with Addis' findings in normal individuals as to the number of formed elements in the urine collected over a 12 hour period. Patients having cardiac disease with and without congestive failure were observed. Although the total number of casts, red cells, and white cells may be within normal limits, the averages of patients having heart disease with and without congestive failure were greater than normal, especially in the latter group which showed the highest values.

Horine and Weiss believe that there should be a closer correlation between retinal changes and cardiac disease. Retinal changes in essential hypertension, they point out, are different from those of simple arteriosclerosis. They suggest the term of arteriolar sclerotic retinitis when referring to essential hypertension in place of arteriosclerotic retinitis.

VII. Roentgenology

By means of rendering the esophagus visible to roentgen rays with barium sulphate, *Parkinson and Bedford* show that various impressions reveal themselves as a result of pressure on this organ. They are from above downwards, the aortic, the pulmonary artery and slight left auricular curves. Pathological conditions such as aneurysm of the pulmonary artery, congenital heart disease, especially patent ductus arteriosus, goitre, mitral stenosis, and emphysema will cause enlargement of the pulmonary artery. This will result in greater deformity of the barium column in the esophagus and will serve as a further aid in diagnosis.

Four cases were presented by *Rösler and White* of patients having arteriosclerosis with or without hypertension or lues but having unusual x-ray findings all of which could be explained by abnormal lengthening of the aorta as a result of sclerosis. The oblique views were helpful in all cases to establish the diagnosis which included in the differentials aneurysm of the descending aorta and coaretation of the aorta.

The size and shape of the heart in two pathological conditions have been discussed in two papers. *Parkinson and Cookson* examined the roentgenograms of 130 patients with goitre symptoms. They found an exaggeration of the pulmonary arc in 1/3 of the cases and reviewing the postmortem records on 43 cases, dilatation of the pulmonary artery was a frequent finding. This was thought to be an early change but where the symptoms are severe and of long standing a general enlargement with preservation of the normal contour is found, the greatest size being reached when auricular fibrillation was present. The picture differs from mitral stenosis in that the left auricle is not prominent. When the symptoms are mild and of short duration the heart is found to be normal in size, consequently the x-ray picture is a helpful adjunct in determining the severity of the cardiac lesion in a patient with goitre. *Ball* reports a case of secondary anemia due to bleeding fibroids in which there was a large dilated heart reverting to its normal size and shape with improvement of the anemia.

Papp concluded, in reporting three cases of the tetralogy of Fallot, that the diagnosis of that condition is chiefly a roentgenological one. He finds the aorta markedly deviated to the right and the middle arch corresponding to the pulmonary artery is absent on the left, being replaced by a concavity.

VIII. Electrocardiography

Cheer and Dieuaide report that in cases of cardiac failure due to various causes, the electrical systole (Q-T interval) is prolonged beyond normal limits, considering the heart rate. This has been expressed in a formula in which the value of "K" is the ratio between systole (Q-T interval) and the square root of cycle length (R-R interval). No direct relation was found between this value and the degree of heart failure. Both hypertensive and syphilitic cardiovascular disease have higher values than does rheumatic heart disease. No correlation was found between this value and ventricular preponderance and the heart size.

Dock has also investigated the electrical systole in relation to myocardial degeneration. To determine whether or not the duration of systole was an index of cardiac function the electrocardiograms of a group of normal patients and of some with definite changes were studied in this respect. Because only one-third of the failing hearts showed a duration of systole longer than that of normal cases, this was deemed an unsatisfactory criterion much less useful than the estimation of the vital capacity. It was noted that systole is 3 to 5 per cent longer in normal women than in men.

Studying the significance of electrocardiograms displaying a Q wave in lead three that was more than 25 per cent of the greatest amplitude of the Q-R-S complex in any lead, *Willius* found 300 such records in 70,000 that answered Pardee's criteria. Of these only 3 patients had normal hearts. The conditions in

which they were found were hypertensive heart disease 40 per cent; arteriosclerotic heart disease without angina pectoris 11 per cent; angina pectoris without hypertension 25 per cent and with hypertension 13 per cent; and miscellaneous conditions exerting influence on the left ventricle 10.7 per cent. T wave negativity was found in 28.6 per cent. He says that "in 198 cases (66%) the large Q wave in lead three was the only significant electrocardiographic feature present, permitting the conclusion that this abnormality may be considered as an additional diagnostic sign."

Steuer and Feil report that in a series of 119 electrocardiograms of normal individuals, notching of the terminal portion of the Q-R-S was not found in all three leads although it was present in one or two leads of 21 cases. Of 4000 electrocardiograms, however, splintering of the final portion of the Q-R-S complex in all leads was found in 34 plates. Some cardiac abnormality was present in every case. Of this group left preponderance occurred in 22 instances (65%), right preponderance in 2 (6%) and no preponderance in 10 (29%). It was concluded that splintering of the terminal portion of the Q-R-S is distinctly abnormal.

Wilson and his associates believe that the clinical electrocardiograms heretofore ascribed to right bundle branch block are due to left branch block and vice versa. This is not necessarily in conflict with the hypothesis that the electrical axis at a given instant points in the average direction in which the excitation process is spreading at that moment. Both the dextrocardiogram and the levocardiogram, canine and human, are dominated by electrical effects produced by the ventricular septum. Preponderant hypertrophy of one ventricle increases the magnitude of the electrical effects produced by the opposite ventricle by increasing the mass of its septal wall without altering its lateral wall.

Although much has been written about inverted T waves little has been said about flat or small T waves. Consequently 107 patients were studied by *Master* with electrocardiograms showing the amplitude of T not exceeding 1 mm. in any lead. It was thought to be a transitory stage, inversion following with progress of the disease. All of 12 autopsies showed myocardial degeneration. Flat T waves are frequently associated with arteriosclerosis, rheumatic fever and pleural effusions, and indicate a severe form of the illness in pneumonia, tuberculosis, and hyperthyroidism.

In line with some work done previously with dogs who failed to show inverted T waves after the administration of toxic doses of digitalis, nine normal adult patients were likewise given standardized digitalis by *Brams and Gaberman*. The point of toxicity was reached in all cases, ascending doses having been given, as demonstrated by nausea, vomiting, and some evidence of block. Electrocardiograms taken three times daily failed to show any inversion of the T wave although the amplitude was transiently decreased a slight amount in some of the plates.

The results of a clinical study of 100 patients with a complete inversion of lead three of the electrocardiogram are presented by *Bland and White*. In 72 per cent of the series, factors were found on physical or roentgen examination which predisposed to a transverse position of the heart. Obesity was the most frequent condition encountered (55 per cent of the total series). A completely inverted lead three in the majority of cases has little clinical significance, other than as an indication of the type of individual; namely, one in which are present conditions giving rise to a high position of the diaphragm and a transverse position of the heart.

White and Sprague have made a statistical study of the electrocardiographic examination of 10,000 patients.

The electrocardiograms were studied by *Perry* of 50 boys and 50 girls having clinically normal hearts. Sinus arhythmia was found in 72 per cent and varied inversely with the rate of the heart, which was on the average for the girls 98.5 per minute and 86.8 for the boys. The P-R interval varied slightly in the three leads but averaged .148 seconds in lead three. Q III was well marked in the children of 5 and 6 years, but did not occur at any of the later ages. T III was found inverted in 54 per cent of the cases, very frequently accompanying slurring or splintering of the Q-R-S complex in lead III.

Shookhoff and Taran have also studied the electrocardiograms in 259 normal children between the ages of 6 and 13 years. The heart rate was found to decrease as the children grew older, being higher in girls than in boys. Exercise showed no changes except to increase the heart rate and to decrease the sinus arhythmia. This latter condition was found more commonly in the older children. The P-R interval averaged 0.125 seconds and the Q-R-S interval 0.051 seconds. There were no abnormalities of the T waves in leads I and II but they were inverted in lead III in 25 per cent of the children. Daily tracings showed no changes except in the direction of the T wave in lead III which varied from time to time.

Shookhoff and Taran have also analyzed the electrocardiograms taken of children with infectious diseases. Of 50 children with scarlet fever admitted consecutively who were studied electrocardiographically, the cardiac rate did not differ from that in normal children in the same age group. In children with fever the increase in rate was commensurate with the increase in temperature. A relative bradycardia, beginning in the second week and returning to normal at the end of the third week, was observed in 25

per cent of the cases. Sinus arhythmia occurred just as frequently as it did in normal children. No prolongations of the P-R interval were observed. Only minor changes in the T or R-T waves were noted in 10 per cent of the children. These changes returned to normal before the patient was discharged. An abnormal axial deviation occurring during the course of the illness was noticed in 16 per cent of the children. The deviation of the axis returned to normal limits before discharge in all but one child. These observations differ from those described in rheumatic fever in (a) the comparative infrequency of electrocardiographic evidence of myocardial involvement; (b) the absence of any tendency for abnormalities, when present, to persist, and (c) the absence of prolongation of the P-R interval.

Von Kiss likewise observed changes in the electrocardiograms of children with diphtheria that he believes are indicative of myocardial damage.

Weiss has analyzed the electrocardiograms of 87 children with chronic rheumatic heart disease. Changes in the P waves such as notching and a greater average height and duration than is seen normally were the most important findings. These P wave variations when most marked occurred with greatest frequency in the children suffering with advanced cardiac failure. The auriculoventricular conduction time was increased in 30 per cent of the cases and right axis deviation was present in 60 per cent of the patients with mitral stenosis.

Daily electrocardiograms were taken by *Master* and his associates on 45 patients with lobar pneumonia and on seven with bronchopneumonia. In 18 (35%)of the cases, the P-R interval was prolonged ranging from .2 seconds to .24 seconds and appearing in convalescence after the temperature was normal. Flat or inverted T waves of the coronary type were seen in 16 patients, occurring early, being transitory, and indicating a poor prognosis. Besides T wave changes, the fatal cases showed marked tachycardia, an absence of auriculoventricular conduction impairment, of bradycardia, and of large T waves. Myocardial involvement is suggested as the cause of the T wave, P-R, and R-T abnormalities. No coronary occlusions were found at autopsy. The bronchopneumonia cases showed only 14% of R-T changes whereas it was 93 per cent for the lobar group.

Proger noted that of 55 patients with obesity but no demonstrable cardiac pathology 39 (71%) showed some degree of left axis deviation, 39 showed an inverted T III, and 24 had either flat or inverted P waves in lead III. In a group of cases of normal-sized individuals with left axis deviation, an inverted T III was rarely found, whereas in obese patients with the same deviation it was frequently explicable apparently on change of position rather than ventricular hypertrophy. These cases showed similar degrees of left axis deviation as did a group of 40 cases with obesity complicated by hypertension. Therefore, axis deviation is not a reliable criterion for ventricular hypertrophy in the obese. Age and sex seem to have no definite relation to the electrocardiographic changes.

Friedlander found no electrocardiographic changes pathognomonic of cardiovascular syphilis in a study of 100 cases. He found a striking parallelism between this condition and arteriosclerosis in its effect on the electrocardiogram. *Kahn* points out that negative electrocardiograms in angina pectoris should not be considered diagnostic inasmuch as he found no changes in 41 per cent of 330 typical cases and in 30 per cent of fatal cases. Trivial changes, however, are probably of great significance.

Cooksey and Freund made serial electrocardiograms in 24 cases of acute coronary occlusion and found positive evidence in every case. This consisted of R-T and S-T interval deviations, T wave inversions or flattening, and decrease of the amplitude of the Q-R-S complex in a short space of time.

Feil and his associates ligated the descending left coronary artery in dogs and found no characteristic R-T changes in the electrocardiogram. Further interference with the myocardial vascular supply such as ligation of the inferior vena cava or the presence of arhythmias did produce R-T deviations. These deviations are probably due to myocardial ischemia in the production of which coronary occlusion is one factor. *Katz and Wallace* illustrate a similar idea with three cases which show that acute myocardial ischemia as adjudged by the R-T deviations, depends not only on coronary occlusion but also on the competence of the heart and its dilatation.

Clinical use of the electrocardiogram by surgeons prior to prostatectomy is recommended by *Bacon* and his associates to detect myocardial impairment where the physical signs may be negative.

Campbell and Turkington have analyzed 30 hospital and 26 consultation cases having right bundle branch block (old terminology). Of these, 39 per cent are living, the longest duration being 13 years. The various etiological factors were discussed as well as the symptoms and signs. Myocardial insufficiency to a marked degree was present in 34 cases.

Turner has presented a paper in which seven cases have been added to the 65 now in the literature of the electrocardiographic registration of the dying human heart. This article contains a review of these cases revealing that conspicuous slowing of the heart beat occurred in 70 per cent and ventricular fibrillation in 20 per cent. Auriculoventricular nodal rhythm or

an idioventricular rhythm is common. The mechanism varies but little in the various age groups with or without heart disease.

Ssalischtscheff and Tschernogoroff observed the results of tests made on 13 healthy subjects in which they smoked cigars or cigarettes to the point of toxicity. The electrocardiograms remained unchanged in the majority of the cases.

For experimental purposes, such as the administration of drugs, *Pollack* has described a technique for taking electrocardiograms of the isolated chick embryo hearts thereby making available intact warm-blooded hearts for investigative purposes.

IX. Other Methods

Bock, in discussing the tests of physical fitness generally, describes the changes that take place in exercise such as the increased oxygen consumption and lactic acid accumulation which together with vagal reflexes result in greater pulmonary ventilation. The circulation rate is increased as the output of the heart goes from 4 to 8 liters to 20 liters or more per minute. The cardiac output depends on the contractile power of its fibers and on its rate. The trained man reacts to the same amount of exercise much more efficiently than does an untrained man. Exercise tests then give evidence of the general physical fitness which is controlled by the state of the cardiovascular apparatus. A good response to an exercise test indicates that the functional state of the circulatory apparatus is good at that time, but organic heart disease may coexist.

Some further evidence than that provided by the usual physical examination would be very helpful in classifying insurance applicants. A functional test should make evident some impairment of function if such is present. The "Flarimeter Test" and "Cardiorespiratory Tests" are described by *Frost* which, although of recent use, point toward giving satisfactory results.

MacKenzie and his coworkers are perfecting a functional test that is especially interesting to insurance examiners. They present the results of 1500 cases as a basis for interpretation of further flarimeter tests. The principle underlying their instrument is to observe the changes in blood pressure, and so the response of the heart and its coördinating mechanisms, to increased intrathoracic pressure as recorded by blowing into a flarimeter.

Harrison and his group have also presented a functional test devised to estimate cardiac efficiency. Dyspnea is proportional to the ventilation per square meter. After standard exercises, the ventilation is measured by means of a spirometer and after corrections a ventilation index is determined. As yet, conclusive estimates as to the value of the test are not possible.

Efforts to improve methods that are better for analyzing the heart sounds than is possible by ordinary auscultation are being made in Germany, namely, by *Jakobsohn* and the physicist *Trendelenburg*. The essential components of the heart sounds lie in low tone areas (up to 80 Hertz) whereas the components of the important murmurs are in a higher tone area (at 300 Hertz and above). The ear is sensitive to the higher tone ranges but much less sensitive to the lower tones. It is this difference that makes comparison difficult between heart sounds heard with the ear and those recorded by mechanical amplification.

McGuire and Foulger believe that the use of needle electrodes and thoracic leads may be helpful in the interpretation of electrocardiograms when the ordinary leads are doubtful.

Winternitz and his associates describe their method for determination of the circulation time which they have used in 700 tests on 300 cases. It consists of injecting 5 cc. of a 20 per cent solution of sodium dehydrocholate into an arm vein. In normal persons there is a bitter taste sensation which appears in 8 to 14 seconds after the injection. Factors influencing the circulation time are given. They believe that this is a practical method of determining the circulation time and may be helpful in diagnosis.

Fraenkel has emphasized the value of probatory strophanthin injection. If a patient feels subjective relief after an injection of strophanthin, he should be subjected to strophanthin therapy, because this subjective indication of relief is a sure sign of cardiac insufficiency.

A complete list of references will appear at the end of this article which is to be continued.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 19141

POST-TONSILLECTOMY COMPLICATION IN A CASE OF RENAL DISEASE

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. DAVID A. YOUNG*: This is the case of a fifteen year old Canadian schoolboy.

The story went back three and a half months, at which time he noticed slight puffiness under the eyes. A week later he noticed swelling of the lower legs. The edema progressed to the extent that after a month it included the face and abdomen. At that time he was seen by a doctor and was put on a milk diet for a week. He was not confined to bed. A good deal of his edema left him, but returned as soon as he was taken off the diet. The edema kept on increasing slowly but progressively until the present admission, with the exception that six or seven weeks before admission, during an acute upper respiratory infection with a temperature of 104°, a great deal of the edema disappeared with a marked diuresis. Following the infection the edema recurred. From the onset a large amount of albumin was found in the urine, later white blood cells and granular casts; no red cells. The systolic blood pressure was 115 at the onset, 130 later. He had received various diuretics, ammonium nitrate, salyrgan, thyroid extract, and "anascarcin", containing digitalis and something else. He had no relief from anything except the milk diet.

The past history was negative except for measles. There was no history of scarlet fever or sore throats.

Examination on admission showed a pale, undernourished, edematous boy. The fundi showed slightly blurred disks, some tortuosity of the vessels and slight caliber changes. There was very little glandular enlargement. There was a moderate blowing pulmonic systolic murmur. The blood pressure on admission was 155/100. The rest was what one would expect from marked edema, generalized anasarca. The edema included slight edema of the face, great edema of the belly wall and ascites, and marked pitting edema of the lower extremities.

On admission the laboratory work showed a white blood cell count of 17,000, a red cell count of 3,800,000 and a hemoglobin of 75 per cent. The differential count was not remarkable. The urine on admission showed a trace of albumin, high concentration, specific gravity 1.020, no red cells, occasional hyalin casts. Repeated examinations showed a trace to a large trace of albumin and also a slight amount of sugar. On account of the fact that this was considered nephritis rather than nephrosis an Addis cell count was done on a twelve hour specimen of urine. It showed 10,500,000 red cells, 12,450,000 white cells and 2,250,000 casts. The non-protein nitrogen on admission was 40 milligrams, the creatinin 1.5. The serum protein was very much decreased, 3.8, the cholesterol 797. A renal function test showed 2.5 per cent excretion after fifteen minutes, 7.5 per cent in the second fifteen minutes and 7.5 per cent in the second half hour; a total of 17 per cent in the whole hour.

DR. TRACY B. MALLORY: How high did the concentration go?

DR. YOUNG: From 1.020 to 1.028.

A chest tap showed a low gravity fluid having the nature of a transudate.

He was in bad condition. He was tried on a small amount of salt to increase the edema, and it did. Salt was withheld after that. He gained weight very slowly. We decided that it would be a good idea to take his tonsils out to remove the foci of infection, on the principle that not all the damage had yet been done to the kidneys that would be done. Tonsillectomy was done. He was returned to the ward two days later with the edema very much increased. Shortly after his return he had a rise in temperature to 103° and a shaking chill. For the next two or three days he ran a septic temperature of 104° to 105°. Two days after the tonsillectomy he had a localized pain in his right leg near the knee. Realizing that it might be phlebitis or an osteomyelitis we called for a surgical consultation. The surgeons thought exploration was necessary. It was done quickly under ether anesthesia. No pus was found. After his return to the ward he grew steadily worse. His edema on the other hand decreased because he lost a great deal of the fluid from the wound. The following day he became much worse. A blood culture showed hemolytic streptococcus. The temperature rose to 106°. He died five days after the tonsillectomy.

CLINICAL DISCUSSION

DR. FREDERICK T. LORD: This problem was of intense interest with respect to the differential diagnosis between nephrosis and glomerular nephritis. While there were aspects of the problem which suggested a nephrosis,—the high cholesterol, the ascites, the low serum

*Recently senior interne on the East Medical service.

protein,—there seemed enough evidence in favor of a glomerular nephritis to warrant that diagnosis rather than the diagnosis of nephrosis other than a complication. It seemed to us that the high blood pressure, the high non-protein nitrogen in the blood and the red blood cells in the urine were enough to throw the case into the category of glomerular nephritis.

The question as to tonsillectomy was a difficult problem. In view of the evidence suggesting glomerular nephritis, the lack of improvement during the period of three and one-half months and the possibility of irritation of the kidney by absorption from the focus of infection, it seemed desirable to have the tonsils removed. The fatal termination may be ascribed to the combination of the renal disturbance and an infection of the lower extremity with hemolytic streptococcus septicemia.

What was the specific gravity of the chest fluid?

DR. YOUNG: It was 1.002.

DR. LORD: That would suggest that the fluid was associated with his renal disturbance rather than a passive transudate.

DR. ARLIE V. BOCK: The question of transfusion was brought up in this case before tonsillectomy. I rather felt it should not be done. I should like to use this occasion to find out if anyone knows whether transfusion will increase the serum protein.

DR. YOUNG: It did not in this case. We did a transfusion.

DR. BOCK: I am not certain about the difference in the serum protein before and after transfusion, but I have not had enough experience to know whether transfusion or repeated transfusions have any permanent effect upon serum protein when nephrosis is present.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Chronic glomerular nephritis with edema.
Septicemia?

ANATOMIC DIAGNOSES

Subacute glomerular nephritis with superimposed nephrosis.
Septicemia, streptococcus hemolyticus.

PATHOLOGIC DISCUSSION

DR. MALLORY: The autopsy on this boy was limited to the examination of the kidneys, so we cannot tell you much about the conditions elsewhere. He was obviously septic at the time of death, with a positive hemolytic streptococcus blood culture. His kidneys showed what was generally expected. They were very large, pale kidneys weighing over 400 grams. There were bright red linear markings of congested vessels but no very definite petechial hemorrhages on the surface. As far as the gross appearance of the kidneys is concerned, it would be consistent either with a pure nephrosis or a subacute glomerular nephritis, that is, a glomerular nephritis with a superimposed nephrosis.

The sections show clearly that the latter is the case. The autopsy was performed a great many hours postmortem, so that the preservation was not very good, but one can see at once that there is no extensive destruction of kidney tissue such as one would find in a chronic glomerular nephritis. The glomeruli appear in normal numbers and are separated by approximately normal distances from each other, possibly separated a little farther from each other than is perfectly normal.

With high power it is possible to make out in a great many places foci of endothelial proliferation in the capillaries of the glomerular tufts and occasional foci of capsular proliferation. In the majority of the glomeruli not more than one or two capillaries in the entire tuft show evidence of change. Occasionally as much as half of a glomerulus is involved. In a very few glomeruli the change has extended to nearly the entire tuft. The tubules are uniformly slightly dilated. The epithelium is swollen. The lumen is filled with albuminous material and in places with quite definite hyalin casts. The extent of the tubular damage is much more evident with the fat stain. The great majority of the tubules and a considerable number of the glomeruli show very extensive lipoid deposits. Here is a glomerular tuft with its efferent tubule and a very marked degeneration just at the junction of the tubule and Bowman's capsule. We have then definite anatomic evidence of a moderate degree of glomerular involvement not rapidly progressive in type, and of tubular degeneration which at the moment is the predominating progressive lesion.

I think perhaps the most interesting question for discussion is whether or not tonsillectomy should be attempted in a case of this sort. The vast majority of deaths from pure nephrosis are deaths from infection. It is very seldom the renal disease *per se* that kills the patient. We are not dealing with pure nephrosis here; but with such extensive nephrotic elements perhaps one should consider very seriously the risk of starting up an infectious process.

DR. BOCK: I think in view of this experience I would vote against it in the future. We have a boy of twelve now with an acute exacerbation of what appears to be chronic glomerular nephritis, with very large tonsils. The question of tonsillectomy came up yesterday. I shall want to be quite sure that all the evidence of activity has subsided before tonsillectomy is done.

DR. MALLORY: It is a very difficult question, because one has a right to assume that if the focus of infection is still present the nephritic lesion will presumably progress.

DR. FRANKLIN G. BALCH, JR.: What is the effect of ether anesthesia on the kidneys?

DR. MALLORY: So far as I know it has none.

DR. MYLES P. BAKER: It would be interesting to know if he had an increased hematuria directly after the tonsillectomy. They often do, even in cases where there is very little demonstrable hematuria. The activity of the renal lesion is increased a great deal, and it is common in the three or four days after tonsillectomy to have a distinct increase in red cells in the urinary sediment.

DR. BOCK: In view of our experience with tonsillectomy in rheumatic fever cases that are not doing well after two or three months of continued activity, we occasionally take the tonsils out and the symptoms may immediately subside. That is the basis of the argument that was used in this case.

CASE 19142

CHRONIC ARTHRITIS WITH RECENT EDEMA OF THE FEET

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. RICHARD S. HAWKES*: This is the case of a fifty-one year old Nova Scotian construction engineer who came in complaining of swelling of the feet of three months' duration and arthritis for fifteen years.

Fifteen years before entry, in the summer, when he was working hard and was very tired, he first observed that his right knee gave way occasionally. A year later the knee became swollen. Because of the knee, frequent attacks of epigastric distress after meals, and loss of appetite he went to a hospital, where a diagnosis of chronic appendicitis was made. His knee was put in a cast at this time. His appendix was removed the following year by his doctor with relief of his abdominal symptoms. During the intervening years he had intermittent swelling and stiffness in the right knee and in the proximal joints of both middle fingers, and stiffness and lameness of the spine which progressed to bowing and a partial rigidity also involving the neck and jaw. He was however able to get about and continue his work very well. During the past nine months he had been receiving injections of amidoxyl benzoate and osteopathic treatment of his joints with improvement at times. The physician who gave him these injections found repeatedly a slight trace of albumin in the urine and about two red cells per high power field.

Three years before entry the patient began to notice slight shortness of breath. Three months before entry he noticed some increase of dyspnea and palpitation on exertion and loss of appetite. His feet began to swell; this progressed, increasing slowly to generalized anasarca. His urinary output was diminished. He spent six weeks in a hospital with little improvement. There he was put on diminished fluids; the other details of treatment he did not know. There was slight improvement after leaving the hospital. Then, however, his edema increased more than previously. Two months before admission dancing specks appeared before his eyes. One week before entry he became extremely orthopneic and the anasarca had increased, becoming very severe. The day before entry he felt choked up and could not sleep at night.

The family history and marital history are negative.

The past history shows nothing significant except iritis, for which he was treated in the Eye and Ear Infirmary twenty-one and fifteen years before entry.

Examination showed a pale, pasty man lying propped up in bed, slightly dyspneic. The head, neck, upper chest and arms were emaciated. He showed tremendous edema everywhere else, giving a false impression of good nutrition. There were a few small palpable glands in the cervical, axillary and supraclavicular regions. The spine showed limitation of motion and some anterior bowing of the upper part, but the degree was not estimated because of his discomfort. The chest was flat, the expansion poor. The heart sounds were of poor quality. It was difficult to estimate the heart size by percussion because of fluid at the lung bases. The blood pressure was 105/75 at admission, 90/65 four days later. The abdomen was very round, bulging in the flanks, the wall very edematous. There was dullness in the flanks, with fluid wave. The liver dullness extended upward to the fourth space. We could not tell whether the liver was enlarged downward. There was slight edema of the scrotum, massive edema of the legs and feet and of the hands up to the elbows. Careful examination of the joints was not made because his other complaints were more recent, but besides the findings in the spine both little fingers were noted to be spindle-shaped and the right knee to contain fluid. The reflexes were not demonstrated on account of the edema.

Urine examination showed a specific gravity of 1.018, a trace to a large trace of albumin, 2 to 5 white cells and rare red cells in the sediment, one or two hyalin and granular casts per high power field. These urinary findings did not change while he was in the hospital. The white blood cell count was 19,200 at admission, falling to 11,000. The hemoglobin was 55-60 per cent. The red count was 4,500,000. Smears showed great variation in size and shape with crescent and tailed forms and some stippling.

*Recently senior interne on the West Medical service.

The platelets seemed to be increased. Three of six stool examinations showed positive tests for blood. A Hinton test was negative. The non-protein nitrogen was 36 milligrams just before death. The uric acid was 3.5 milligrams, the serum protein 3.1 per cent, the cholesterol 288, the chlorides 601. A renal function test by the phthalein method showed less than 5 per cent excretion of the dye in fifteen minutes. An electrocardiogram showed normal rhythm, rate 80, flat T wave, low voltage. Quantitative albumin determination of the urine showed 7 to 10 grams per liter. The average daily output was about 1050 cubic centimeters.

He was treated with a high protein, low salt diet. Fluids were limited to fifty ounces daily. He received two ounces of magnesium citrate daily, which kept his abdominal distention down. He was digitalized and given salyrgan twice a week. He gained fifteen pounds in fifteen days in the ward, became steadily weaker and died quietly fifteen days after admission.

Clinical Discussion

Dr. Arlie V. Bock: This case was very difficult from a diagnostic point of view. The early history, suggesting the onset of an attack of what appeared to be acute hemorrhagic glomerular nephritis, and then the joint picture, seemed to me consistent with a chronic type of so-called infectious arthritis. The question of what rôle his heart played in the whole picture when he was admitted here, in view of his anasarca, was a difficult one to answer. I thought that the man had started with a glomerular nephritis, now had a superimposed nephrosis, much as in the first case, Case 19141, had infectious arthritis and an arteriosclerotic heart with congestive failure. There were a number of diagnoses, but the outlook appeared hopeless from the time he entered the ward.

Clinical Diagnosis (from hospital record)

Chronic glomerular nephritis.

Anatomic Diagnoses

Amyloid disease of the kidneys, the spleen and the liver.

Hypertrophy of the heart.

Pathologic Discussion

Dr. Tracy B. Mallory: The clinical picture here is obviously a peculiar one for a man over fifty. He came in with a hypotension and extreme edema, which is rather unusual at the very start. The superposition of nephrotic on nephritic conditions is very common in youth but not in adults, and yet the extreme edema, the very large trace of albumin and the low serum protein all seem definite enough to make one feel pretty sure that there must be a nephrotic element.

We found that nephrotic element at autopsy, although I think the nature of it was a complete surprise to all of us.

A Physician: What did his kidney look like grossly?

Dr. Mallory: It was normal in size, distinctly firmer than normal and rather pale.

The liver was considerably larger than normal, 2200 grams, rather firm, with very prominent nutmeg markings such as would go with chronic passive congestion but were not altogether typical of that.

The spleen was the most striking organ. It was moderately enlarged, extremely firm and very translucent on cross section. There was also an accessory spleen 3 cubic centimeters in size, absolutely similar in character.

The kidney shows a great many partially or completely hyalinized glomeruli. As one looks about the kidney with a low power there is an occasional sclerosed glomerulus such as one might find in ordinary vascular nephritis; but a great many of the other glomeruli show a diffuse thickening of all the capillary walls by a rather pale pink hyalin material. The diffuseness of the hyalin material and the involvement of every single glomerulus with only a relatively small amount of tubular atrophy is something one can find only in amyloid disease, which specific stains show this to be.

The amyloid is obviously present in many other organs. In the spleen there is hardly a lymphocyte left. A diffuse amyloid deposit is present throughout the corpuscles and also throughout the pulp as well. It is about as extreme an amyloid reaction as I have ever seen in the spleen. In addition there is an unusual phenomenon in that the amyloid is provoking a foreign body reaction. Around the amyloid are huge foreign body giant cells in many instances.

The liver shows the usual amyloid deposits in narrow lines between the endothelium of the sinuses and the cords of liver cells, most marked in the midportions of the lobules. Immediately around the portal area it is relatively free from it. When we get into the center we have quite marked central necrosis such as we get with chronic passive congestion.

The source of the amyloid disease in this case is interesting to speculate about. We were unable to find anything that seemed entirely satisfactory. I think it is very probable that this man had some degree of chronic nephritis antedating the amyloid disease. Not all the changes present in the kidney can be explained as amyloid. Whether loss of albuminous material from the kidneys would be an adequate cause or not I do not know. I rather doubt it.

Dr. Bauer and Dr. Bennet examined the knee joint in this case and found that it showed a

very unusual type of arthritis. They thought it was a definite septic arthritis. The entire joint capsule was filled with reddish fibrinous material. The cartilage of both articular surfaces was completely destroyed and a good deal of the bone was destroyed as well. They felt that for ten years at least he must have had a septic arthritis in that knee joint. Whether that was the origin of the amyloid is questioned.

DR. PAUL D. WHITE: What did the heart show?

DR. MALLORY: The heart was slightly hypertrophied, weighing 420 grams. The coronaries were negative.

DR. WHITE: Did the muscle appear normal?

DR. MALLORY: Yes.

DR. WHITE: Dr. Hawkes mentioned the low voltage in the electrocardiogram. It is an abnormal finding associated usually with poor function of the myocardium, although not necessarily indicating actual myocardial disease; anasarca has sometimes been cited as the cause of low voltage, but such a relationship is at least not a uniform finding; here all we can say is that the low voltage reflects a faulty circulation.

DR. MALLORY: You think that that would adequately explain his very low blood pressure? With a hypertrophied heart and the story of hemorrhagic nephritis in the past I should rather expect him to have had an elevated blood pressure instead of a distinctly subnormal one.

DR. WHITE: We frequently see well marked hypertension with cardiac enlargement in individuals who later show normal or low blood pressure when the heart or circulation fails, the cardiac enlargement remaining as evidence of the previous hypertension.

DR. MALLORY: You do not necessarily have low voltage with failure, do you?

DR. WHITE: No.

DR. MALLORY: I think it is quite a unique case as far as any material we have ever seen at this hospital is concerned. Amyloid disease used to be very common. Now it is so very rare that we seldom think of it any more and even miss it on the autopsy table when we have the organs in our hands.

DR. WHITE: Why is that?

DR. MALLORY: I think there is no very satisfactory explanation, Dr. White. A part of it is an apparent phenomenon only, due to the effectiveness with which at the present time certain types of cases are isolated from general hospitals. Comparatively few cases of tuberculosis come in here, for instance. The type of case in which amyloid is expected to occur is of course the patient with a persistent draining sinus for a long period of years, such as tuberculosis of the bones and joints, chronic osteomyelitis and cavernous pulmonary tuberculosis. They still see the condition occasionally in tuberculosis sanatoria. Even there it is not so common as it used to be. Of course, too, the orthopedic treatment of the past twenty years is so enormously superior to that of twenty or thirty years ago that chronic sinuses are very seldom permitted as they used to be in 1900. In Vienna one still sees plenty of amyloid. In six months I saw at least a dozen cases, whereas we have had only four cases in six years here.

CASE 19143*

THREE WEEKS' DYSPNEA AND VOMITING

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. DAVID A. YOUNG**: This is the case of a fifty-seven year old Finn who came in with the complaints of shortness of breath for two years and vomiting for three weeks.

Seven years before admission he had a right inguinal hernia repair followed by attacks of localized midepigastric pain which came on usually half an hour to an hour after meals. It was often relieved by food or soda. He often vomited with it. He sometimes would go for two months without an attack. Five years before admission he had pneumonia followed by dyspnea on exertion and some weakness when he tried to do anything. He had also a slight non-radiating chest pain localized over his precordium. This had gradually increased and occurred more frequently when he exerted himself. Two years before the onset he had a rather severe occipital headache coming on in the evening. The following morning he was hard to arouse. He was fairly well oriented but scarcely recognized his family. He was said to have a shock, but no residual paralysis was noticed. Ever since that time, however, his personality had been altered, his memory poor, and he had had nocturia increasing from 0 to 12 times at night. During the past two months he had had increasing dyspnea on exertion, orthopnea, and the sense of constriction in his chest had been considerably worse. For three weeks he had vomited after almost every meal. He gave no story of swelling of the ankles.

His mother died of dropsy at the age of fifty-six.

He gave a past history of pneumonia at the age of fourteen and again five years before admission. He had had some weight loss recently.

Examination showed a fairly well nourished Finn with dyspnea, some orthopnea and marked Cheyne-Stokes respiration. The face, lips and hands were slightly cyanotic. The rest of the skin showed excoriations. There were dental snags and poor oral hygiene. The tongue was

*The following report gives the essentials of two discussions, one in Dr. Cabot's Third Year Class, one at a conference of the hospital staff.

**Recently senior interne on the East Medical service.

dry. The chest was barrel shaped, particularly at the base. There was poor chest expansion. There was slight dorsal kyphosis. The apex impulse of the heart was felt 11 centimeters to the left of the midline. The sounds were of poor quality. There was an occasional extrasystole. The blood pressure was 260/130 on admission. An electrocardiogram showed normal rhythm, rate 70, marked left axis deviation. He had some dullness in his right base suggesting fluid. There were congestive râles at both bases, and some ankle edema. There was some bulging in the flanks; it was thought that he might have fluid in his peritoneal cavity. In the right upper quadrant three to four fingerbreadths below the costal margin there was resistance to palpation and dullness to percussion. No edge was felt. He had a right scrotal hernia; the left inguinal ring was also enlarged. There was pitting edema almost up to his knees. The arteries of the fundi showed moderate sclerosis.

The blood showed 3,500,000 red cells, hemoglobin 80 per cent, 15,000 white cells. The differential count showed slight increase in polymorphonuclears. The urine showed a specific gravity of 1.012, a slight trace of albumin, rare red cells and occasional granular and hyalin casts in the sediment. A Hinton test was negative. The non-protein nitrogen was 80 milligrams, the serum protein 5 per cent. The non-protein nitrogen rose gradually to 92 and 102 and finally just before death dropped to 87. The specific gravity of the urine by concentration test ranged from 1.008 to 1.010. A renal function test with phenolsulphonephthalein showed only 5 per cent in the whole hour. There were no other very significant laboratory procedures except the white cell count, which varied from 11,000 to 16,000. One stool examination showed a negative guaiac.

On admission he was somewhat difficult to arouse. He went along for a week and a half without any marked changes except that he gradually became more unresponsive. Finally he became quite dyspneic and entirely unresponsive and died fifteen days after admission.

Clinical Discussion

in third year class

Dr. Richard C. Cabot: This case raises the question of the relation of abdominal pain to hernia. There has been a good deal written about it, less, I think, of late years. I do not think it is nearly so popular as an explanation as it used to be. The hernias we used to hear most about as explaining midepigastric pain were epigastric, not inguinal, but we have also heard something of these latter. I do not see how anybody can make a hernia account for a pain that comes regularly after meals. Hernia does not come regularly after meals or do anything regularly after meals. I should say we have no reason to pay any more attention to that hernia as far as this pain is concerned.

Attention is called to three portions of his anatomy as we go along,—(1) abdomen, (2) chest, (3) head.

The first lines of the history of the present illness distinctly suggest a pylorospasm with or without ulcer. I do not believe any human being can tell the difference between pyloric spasm and pyloric spasm producing, as I believe it does produce, ulcer. The x-ray shows the filling defect in the one case and not in the other, but the symptoms are exactly the same. So I should say this man had something which caused his pylorus to shut down and thereby gave him pain after meals, relieved as this pain often is by food and soda, not so often by pressure.

Then we have another chapter which I cannot connect with that: cardiac symptoms which are now the most striking but which have been complicated by a severe headache and cerebral symptoms, which however were not focal, did not point us to any localized lesion in the brain. What the nature of that cerebral attack is I so far have no idea. If it turns out that he has kidney trouble we can hitch it up to that. If he had fibrillation it might have been a paroxysmal fibrillation or the onset of heart block. But both of those were likely to have been noticed by whatever physicians attended him and passed along to the family, so that we should have heard of it in the history. So I do not believe it was a very slow or rapid or fibrillating heart that caused these symptoms. It might be a focal brain hemorrhage even without local signs.

Heart trouble, then, after passing through these stages of pylorospasm and cerebral seizure,—heart trouble is the thing we are facing. At fifty-seven heart trouble is generally of the hypertensive type, so without reading further my guess is that this is a case of hypertensive heart disease.

"The chest was barrel shaped. There was poor chest expansion. There was slight dorsal kyphosis." These three facts doubtless go together and point to the familiar changes of advanced age.

The bulk of this paragraph on the physical examination shows hypertension plus chronic passive congestion, plus arterial changes in the retinae which go extraordinarily parallel, you know, with arterial changes elsewhere, especially in the kidney.

If this renal test is correctly made it certainly shows hyposthenuria, the inability of the kidney to concentrate urine. From the renal function test I should say his kidneys were doing poorly.

The blood examination tends to strengthen the indication that his kidney as well as his heart is involved, for we never get anemia from

pure hypertensive heart disease and we generally get it from hypertensive kidney disease.

Can we see his chart without giving away the diagnosis? The first sheet does not show anything significant. The second sheet shows chiefly that for the last two days the temperature went steadily up. So I should say that aside from the terminal increase there was not much fever. In the last two days it goes up very steeply. I take it he had a terminal infection, presumably terminal bronchopneumonia, but otherwise just what he had before.

I do not think I have anything to add. Hypertensive vascular disease is the thing we are facing, which had its effects on the heart and presumably on the kidney too. He should have the kidneys of progressive vascular nephritis and a hypertrophied and dilated heart as a result of his hypertension.

What shall we say about those stomach symptoms? Did he have an ulcer? It is perfectly conceivable that he did. He had no x-ray that could give us any information, and the fact that he had no symptoms of ulcer towards the end of life is of no importance. We have enough, then, for a perfectly possible diagnosis of ulcer and not enough to prove it. Proof could come from (a) the presence of blood in the stomach and in the stools (studies of acid do not give us much, I think,) and (b) the x-ray, which is nine-tenths of the diagnosis.

He had no brain symptoms while he was here. He did have a definite kidney lesion, as far as all evidences go. I think his attacks of headache were brought on by uremia. It is very possible that his retention products were higher than we found them later. It is possible that there is a hemorrhage at the base or in the ventricles or in the frontal lobes that did not cause cortical localizing symptoms.

DR. MAURICE FREMONT-SMITH: You do get ulcers sometimes in uremia, but that is a very late thing, is it not?

DR. CABOT: We used to hear a great deal about "arteriosclerotic ulcers" and "uremic ulcers", and certainly I do remember a group of cases with just about this combination of stomach and cardiorenal symptoms, but usually with more on the part of the stomach, either hemorrhages or x-ray evidence that would give a better basis for the diagnosis. Whether there is a connection, and if so what connection between the two I do not know. Ulcers come at the same age and in the same sex in which we get most hypertension, and I do not know enough to say whether there is any connection between the two.

Dr. Mallory, did we get any examination of the head in this case?

DR. TRACY B. MALLORY: No, we did not.

DR. CABOT: We shall conclude that we are right about that then, as we never shall know.

CLINICAL DISCUSSION

AT STAFF CONFERENCE

DR. FREDERICK T. LORD: With respect to the diagnosis, the hypertension and the arterial changes all suggested circulatory disturbances proceeding probably from sclerotic changes in the kidney, nephrosclerosis. In addition he had congestive failure. It seems reasonable to assume that the red blood cells in his urine which were few in number might be due to congestive failure.

The third aspect of the case is that he obviously had uremia. He had a uremic odor to his breath. He was stuporous. He had a high non-protein nitrogen.

My diagnoses were nephrosclerosis, hypertensive and arteriosclerotic cardiac disturbance with congestive failure and uremia.

DR. MALLORY: Dr. Young, did you say something about the liver's being very large?

DR. YOUNG: It was on admission.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Chronic vascular nephritis with uremia.
Arteriosclerotic and hypertensive heart disease with congestive failure.
Bronchopneumonia.

DR. RICHARD C. CABOT'S DIAGNOSES

Hypertension with hypertensive nephritis and hypertrophied heart?
Uremia.
Peptic ulcer?

ANATOMIC DIAGNOSES

Polycystic kidneys.
Cardiac hypertrophy, left ventricle.
Bronchopneumonia.
Purulent bronchitis and tracheitis.
Multiple cysts of the liver.
Hemangiomata of the liver.
Accessory pancreatic tissue.
Gastric ulcer, healed.

PATHOLOGIC DISCUSSION

DR. MALLORY: We have a perfect clinical picture of a small contracted kidney, yet the kidneys we found at autopsy weighed about 1,000 grams and were obviously polycystic kidneys.

The liver according to our measurement was at the costal border, so that the mass felt in the right upper quadrant was probably the right kidney. We found nothing else to explain it. We have had an unusual number of these cases this year. This is the fourth. One will often go five years between cases in a hospital of this sort.

A PHYSICIAN: Was there anything in the data suggesting the diagnosis now that you know what it was?

DR. MALLORY: Absolutely nothing except that mass which was felt and was interpreted as the liver. If that could have been correctly interpreted as kidney one would have had the diagnosis.

DR. LORD: I suppose we might have got some assistance with pyelography either by the intravenous or by the retrograde method; but as a matter of fact the diagnosis did not occur to us, and with respect to such procedures, the patient was rather too sick to consider them anyway.

DR. MALLORY: Every symptom so far as I can see is absolutely identical with those of progressive vascular nephritis, that is they have hypertension, relatively little edema until the end, the non-protein nitrogen goes up very little, and almost invariably they have anemia. They generally show peripheral vascular changes, as this man did. He showed, in the small remaining amounts of kidney tissue that we could find for microscopic examination, a very marked arteriosclerotic process. Whether it was primary or secondary I cannot say.

DR. LORD: Is this rather long for the duration of a polycystic kidney, fifty-seven years old?

DR. MALLORY: Fifty is about the average age. They may last until slightly over sixty, but do not ordinarily. They are very uniform as to age grouping.

DR. GEORGE W. HOLMES: I should expect that the intravenous method would be unsatisfactory in these cases because the kidney is not secreting well. I think it would be unwise to use the intravenous method in these cases.

DR. MALLORY: A plain flat film of the abdomen might help in the diagnosis.

DR. HOLMES: Yes.

DR. MALLORY: He had a marked hypertrophy and dilation of the heart, which weighed 500 or 600 grams.

The lesion in the lung, the terminal affair, was more of a purulent bronchitis than a pneumonia. There was very slight evidence of pneumonia in gross, but microscopically we did find a trace of it.

We also found a definite scar of a healed ulcer in the stomach.

DR. FREMONT-SMITH: Was there any coronary thrombosis or arteriosclerosis of the coronaries?

DR. MALLORY: They were very large and capacious.

DR. CABOT: Do you think there is any connection between such cardiovascular things as we had here and the stomach ulcer?

DR. MALLORY: I think it is entirely a matter of speculation. I do not know of any facts that would point one way or the other. I think fairly often these elderly people who first develop ulcer symptoms at about fifty do not show the marked acidity that we find so regularly in a person under twenty. Possibly the etiology may be quite different in the older and the younger age groups, but I do not know any way of being sure of it.

DR. CABOT: How big were the kidneys? Could they have felt them in life?

DR. MALLORY: It would seem so. The pair of kidneys were the same size as the liver nearly, and they should have been felt.

DR. CABOT: That has come out again and again in the years that we have been holding these exercises,—Why didn't we feel those? The general answer is that you do not feel anything that you do not think of looking for. As some one here said, the diagnosis of polycystic kidneys is generally perfectly simple when you think of it at all as a possibility. We generally forget it. The routine physical examination is guided by particular hunches. This particular hunch most of the time does not enter the examiner's head. In the case that we had successfully diagnosed some time ago something put them in mind of it. They thought of it, and because they thought of it they felt the big cystic kidneys.

DR. MALLORY: That last time there had been a case just a week before.

DR. CABOT: Of course if a man is very sick or has a great deal of gas in his intestines we cannot expect to feel these things.

A STUDENT: It is recorded that "in the right upper quadrant three to four fingerbreadths below the costal margin there was resistance to palpation and dullness to percussion". Don't you suppose that was the cystic kidney?

DR. CABOT: I should not be surprised. Of course they thought it was the liver. They go on to say "no edge was felt". That means it is there but you don't feel it. But I think you are quite right that they were on the kidney when they thought they were on the liver. They did not feel any edge because it did not have any edge. Polycystic kidney does not have any.

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MASSACHUSETTS — THERE SHE STANDS

THE "standing" of Massachusetts has often been referred to as something of which the citizens may be proud. But this is a world of relativity and change, and if progress is desirable, standing may be a fault. In the Good Book there is a reference in bitter irony to those whose strength is to sit still.

It is the aim of legislation to be a reasonable reflection of the facts as ascertained. If laws do not approximate the facts with reasonable closeness, it is the laws and not the facts which give way. The law of the Medes and Persians which changeth not is an hyperbole not worthy of the practical statesman. The facts shift according to the law of their inner nature which cannot be set forth in statute, and the statutes should be changed from time to time as experience illuminates the shifting facts of life.

In medical legislation for the protection of the health of the people by the control of medical practice, Massachusetts has the distinction of standing alone—in one respect. There is such a thing as progress in medical legislation, and it is clear also that a medical school should not be allowed to carry on medical education irresponsive to the demands of medical science and practice, irrespective of the opinion of other schools, in entire independence of what other schools think or do. Such independent individuality, with only internal control, tends to loss of balance, lack of symmetry, disintegration of personality and degradation in social responsibility.

In the control or lack of control over the medical education which the state requires of candidates who desire to enter the practice of medicine, Massachusetts stands—still—and alone. All the other states have given their Boards of Registration in Medicine discretionary power of approval of medical schools from which they receive candidates for examination. In the course of years, the procession of other states and federal jurisdictions has filed by, some states many years ago. Colorado, the last of the other states, enacted this legislation six years ago; for the District of Columbia, the last of the Federal jurisdictions, it was enacted four years ago. But Massachusetts—there she stands—still—alone—refusing to enact this law for the protection of the health of the people of this Commonwealth.

Justice Oliver Wendell Holmes has said: "If I am in a minority of one, they send for a doctor or lock me up; and I am so far able to transcend the to me convincing testimony of my senses or my reason as to recognize that if I am alone probably something is wrong with my works."

A CHAPTER IN AMERICAN OBSTETRICS

FROM Boston came two important contributions in the history of American obstetrics. The work of Oliver Wendell Holmes on "The Contagiousness of Puerperal Fever" (1843) and his second paper on "Puerperal Fever as a Private Pestilence" (1855) are too well known and appreciated to require special comment. Walter Channing's contribution to obstetrics, however, has received less attention than it deserves. Recently his work has again been brought to the notice of physicians by Herbert Thoms' "Chapters in American Obstetrics".* Thoms places Channing in the same class with Bard, Stearns, Dewees, Holmes and Wright.

Walter Channing, a brother of William Ellery Channing, began the practice of obstetrics in Boston as early as 1815, while teaching the subject in the Harvard Medical School; the next year he was elected the first dean of the School.

*Thoms, Herbert. Chapters in American Obstetrics. Springfield, Ill. & Baltimore, Md.: Charles C. Thomas, 1933. x + 90 pages.

Two years after the public demonstration of ether anesthesia at the Massachusetts General Hospital Channing published his important contribution, "A treatise on Etherization in Childbirth." To gather his material he had circularized many physicians so that he was able to record, in addition to his argument, the results of anesthesia in 581 cases of childbirth. With this material he presented adequate proof of its beneficence and safety. There was much opposition to the subject, however, both from physicians and from the church. Channing was so obviously honest in his presentation, in addition to the deeply religious aspect of his life, that opposition was overcome and Channing's book stands out not only as a scientific accomplishment but as an historical document.

Channing, moreover, made another contribution to obstetrics. In 1842 he wrote a paper with an unusual title, "Notes on Anhaemia, principally in its connection with the Puerperal State, and with Functional Disease of the Uterus; with cases."* In it, along with reports of cases of various types of anemia, will be found the first recorded description of so-called hemolytic anemia of pregnancy. Thoms points out that there is one paragraph from this contribution which gives remarkable insight into the mind of its author. In speaking of the treatment of the anemia of pregnancy, he writes with almost prophetic vision: "The question of Transfusion has often occurred to me. But of what possible benefit would be such a supply of blood? What might not the effect be of filling almost empty vessels with a fluid so unlike that which already circulates in them, and which their own functions have produced? In a disease so fatal, some risk might be incurred. But is Transfusion an operation which our present knowledge of it would authorize? If safe in itself, however, *might not time be gained by the operation, for such functional changes to occur as would supply healthful blood?*"

*New England Quart. Jour. Med. & Surg. 1: 157, October 1842.

THE CLAIMS BY PHYSICIANS AND HOSPITALS FOR INJURIES TREATED

H. 519, the text of which appears elsewhere on this page, seems to have aroused considerable interest throughout the State in letters to Dr. H. M. Landesman who is the petitioner for the bill.

It is felt that it would provide just recognition of the claims of doctors and hospitals which oftentimes seem to be imposed upon in emergency cases in connection with injuries.

Dr. Landesman reports that he has received much encouragement from physicians in various places throughout the State and, in order to assure satisfactory action by the Legislature, it will be necessary for doctors to use such influence as may be possible with their Representatives.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

FINDLAY, FRANCIS M. A.B., M.D. Harvard University Medical School 1922. F.A.C.S. Assistant Surgeon to Outpatients, Massachusetts General Hospital. Assistant Surgeon, Cambridge Hospital. His subject is "Fractures of the Femur." Page 721. Address: 475 Commonwealth Ave., Boston.

HUNT, ERNEST L. M.D. Harvard University Medical School 1902. F.A.C.S. Director, Division of Surgery, Worcester City Hospital. Pathologist, U. S. Veterans' Hospital No. 89, Rutland Heights, Mass. Consulting Surgeon, Holden District Hospital. Associate Medical Examiner, 11th District, Worcester County. His subject is "Postoperative Thrombosis and Embolism." Page 730. Address: 20 Kenilworth Road, Worcester, Mass.

CATTELL, RICHARD B. A.B., M.D. Harvard University Medical School 1925. F.A.C.S. Surgeon, Lahey Clinic. Assistant Surgeon, New England Deaconess and New England Baptist Hospitals. His subject is "Carcinoma of the Rectum." Page 740. Address: 605 Commonwealth Avenue, Boston.

MCGINN, SYLVESTER, M.D., and SPRAGUE, HOWARD B., M.D. For further information see This Week's Issue, page 708, issue of March 30, 1933.

MASSACHUSETTS LEGISLATIVE NOTES

H. 519 An Act relative to the Liens of Physicians, Nurses and Hospitals for Services rendered in the Treatment of Injuries for which the Patient receives Compensation.

Whenever any person shall employ a physician, nurse or hospital to perform professional service or services of any nature, in the treatment of or in connection with an injury and such injured person shall claim damages from the party causing the injury, such physician, nurse or hospital, as the case may be, shall have a lien upon any sum awarded the injured person in judgment or obtained by settlement or compromise on the amount due for the reasonable value of services necessarily performed: provided, that no such lien shall be valid against anyone coming under the workmen's compensation act. In order to prosecute such lien, it shall be necessary for such physician, nurse or hospital to serve a written notice upon the person or corporation from whom damages are claimed that such physician, nurse or hospital claims a lien for such services, and stating therein the amount due and the nature of such services; provided, that whenever an action

is pending in court for the recovery of such damages, it shall be sufficient to file the notice of such lien in the pending action.

THE HEARING ON THE CHIROPRACTIC BILL

House bill 926 was heard on March 28 by the Public Health Committee of the Massachusetts Legislature.

Dr. Thomas J. O'Brien represented the Massachusetts Medical Society appearing in opposition. He brought forward the arguments which were repeatedly presented to the voters at the time of the initiative petition. Dr. O'Brien was ably supported in his arguments by Dr. Halbert G. Stetson, President of the Massachusetts Medical Society; Dr. Robert B. Greenough; Dr. A. S. Begg, Dean of Boston University School of Medicine; Dr. Stephen Rushmore, Secretary of the Board of Registration in Medicine; Dr. Arthur W. Marsh of Worcester, Dr. George H. Bigelow and others.

The proponents of the bill, through their lawyer, withdrew the bill which had been scheduled and supplied in its place a new draft which they felt would be adequate under the circumstances, because in the new draft an effort was made to do away with certain objections which there have been from time to time with reference to legislation of this character.

The new bill restricts the chiropractors to manipulations of the spinal column and, in the arguments that were presented, efforts were made to show that in this particular restricted treatment there would be no menace to public health or competition with the practice of medicine. A few statements of the proponents of the bill were peculiar in that the claim was made that chiropractors are the only people who really know all there is to be known about the spinal column with the further claim that even educated physicians have been denied the opportunities for studying the spinal column which have been open to the chiropractors and that the medical profession is in consequence wholly unsuited to give the proper treatment of the subluxations of the spine. This reflection on the medical profession was rather amusing in view of the fact that in no place in the world are there so many opportunities for studying anatomy and especially the bony structures as are found in the medical schools.

These people certainly show a considerable degree of courage and enthusiasm after the very stunning defeat which was meted out to them in the last general election.

MISCELLANY

AN ENCOURAGING PREDICTION

Dr. Louis I. Dublin, vice president of the Metropolitan Life Insurance Company, in an address in the annual Cutter Lecture on Preventive Medicine, at the Harvard Medical School, predicted that one-half of all persons born from this date will live to be at least seventy-five years of age. This will be brought about by further reduction of infant mortality from the present levels to about 25 per 1000 births and by cutting childhood mortality in half. More important still is the necessity of lowering the needlessly high mortality in the middle ranges of life.

Dr. Dublin feels that the present mortality of persons between fifty and sixty-five years of age can be reduced by one-third through the application of known principles to personal hygiene.

SUGGESTIONS RESPECTING THE TRAINING OF NURSES

Members of the Grading Committee of the American Nursing Association have advised the closing of training schools for nurses in the smaller institutions, because it is felt that nearly all hospitals having less than fifty beds or hospitals with less than one hundred patients have not the facilities for training nurses, and it is also felt that they can carry the nursing service more economically through the employment of graduate nurses.

Another thought is suggested in that it is inadvisable to add to the wholesale overproduction of graduate nurses because conditions show that throughout the country there are many unemployed nurses with consequently inadequate incomes.

EUROPE NOW CONTROLS SMALLPOX

Figures that have been presented by the United States Public Service indicate that whereas the United States had 46,712 cases of smallpox, and England and Wales 11,839 in 1930, during this same period continental Europe had but 268 cases. This of course is due to more general vaccination in the European countries.

CORRESPONDENCE

COMMENTS ON ULTRAVIOLET RAYS

313 Washington Street,
Newton, Massachusetts,
March 25, 1933.

Editor,
New England Journal of Medicine,

Your editorial on "Report that ultraviolet rays will kill germs" comes as a complete surprise especially when you suggest a confirmation of Dr. Rentachler's report. All this work was done years ago, and can be found recorded in most of the early books and catalogues of ultraviolet lamps.

Dr. Rentachler's statements are undoubtedly true. These rays have been used extensively in *superficial* skin infections such as acute ulcerated lesions, paronychia and erysipelas for years, often with excellent results. When Dr. Rentachler refers to killing typhoid and scarlet fever germs he of course

means in petri dishes and not in tissue substance which would be impossible. Such laboratory work has been done by a great many men on a large variety of bacteria, with uniformly good results when the right lamp distance and time have been used. But when the germs are in the tissues an entirely different condition exists. Here tissue cells, lymphatics, blood plasma and possibly degenerated tissue and pus absorb the rays with but slight mortality to the offending organisms because of this excellent protection, and from the limited penetration of these rays.

With the exception of the overenthusiastic doctor and the overzealous lamp salesman, no one feels that ultraviolet rays are bactericidal deeper than the superficial layer of skin, unless a small area be involved and a quartz applicator applied with pressure. Under these conditions with long enough exposure to give a decided erythema the penetration of the rays is somewhat deeper.

The ultraviolet rays are not of the universal value originally anticipated but are of definite help in a relatively few conditions. However, some of these systemic as well as superficial conditions are much benefited indirectly by these rays. This may be accomplished by general body irradiation which stimulates various complex mechanisms, resulting in greater resistance by the patient to the organisms and the condition cleared up. It might be well to add that these utraviolet rays are also of considerable value in some of the other types of skin lesions which are not of an infectious nature which of course do not come within the scope of Dr. Rentachler's paper.

Dr. Rentachler's paper adds nothing new to our knowledge of light therapy which was well established many years ago.

Very sincerely,

FRANKLIN P. LOWRY.

AN APPROVAL OF THE MINORITY REPORT OF THE COMMITTEE ON THE COSTS OF MEDICAL CARE

Fall River Medical Society

March 25, 1933.

Editor, *New England Journal of Medicine*,

The Committee on Medical Problems of the Fall River Medical Society reported to the Society, March 22, 1933, at a meeting held in the Union Hospital, that it favored the Minority Report of the Committee on Costs of Medical Care.

It was moved, seconded and voted that the Society concur in this report.

Sincerely yours,

GEORGE H. KERSHAW, M.D., *Secretary*.

RECENT DEATHS

WASHBURN—GEORGE HAMLIN WASHBURN, M.D., of 512 Beacon Street, Boston, died March 28, 1933, after a short illness.

Dr. Washburn was born in Constantinople, Turkey, the son of Dr. and Mrs. George Washburn, in 1860. He acquired his early education in Constantinople and after coming to America graduated from Amherst College and later from the Harvard University Medical School in 1886, joining the Massachusetts Medical Society in the same year.

He practiced for more than forty-five years in Boston and was Professor Emeritus of Obstetrics at Tufts College Medical School. In 1918 he served as director of one of the medical units sent by the Near East Relief to Turkey and established fifteen hospitals in Asia Minor. He was a trustee of Robert College of Constantinople which was founded by his grandfather and a member of the Delta Kappa Epsilon fraternity, the Harvard Club of Boston, the University Club and the American Medical Association. He married Anna M. Hoyt of Auburn, New York, in 1887, who died in 1918. A daughter, Mrs. Basil D. Hall of Northampton and three sons, George E. Washburn, Arthur H. Washburn and Dr. Alfred H. Washburn, Professor of Pediatrics of the University of Colorado, survive him.

GEROULD—JOSEPH B. GEROULD, M.D., a resident of North Attleborough, died March 28 at his home, 122 High Street, in his seventy-seventh year.

Dr. Gerould was a graduate of Dartmouth in 1878 and Harvard Medical School in 1881. He had been assistant medical examiner in his district for several years.

He was born in Keene, New Hampshire, February 20, 1856, attended a New London, New Hampshire, preparatory school and then entered Dartmouth.

He was a Fellow of the Massachusetts Medical Society having joined in 1882.

Dr. Gerould is survived by his widow, Mary Faull Gerould, and a daughter, Mrs. Allen Gordon of North Attleborough.

DERBY—WILLIAM P. DERBY, M.D., of Saxonville, died March 29. He had practiced in Framingham since 1916.

Dr. Derby was a graduate of Harvard College and Harvard University Medical School and a Fellow of the Massachusetts Medical Society having joined in 1892.

He had served as school physician in Framingham since 1921, was a trustee of the Framingham Library, a member of the Coeur de Leon Council and Knights of Columbus.

His widow survives him.

KEANEY—HENRY J. KEANEY, M.D., a prominent Everett physician, died suddenly March 1 at his home, 385 Broadway.

Dr. Keaney graduated from the Baltimore Medical College in 1901 after attending Johns Hopkins University School of Medicine and was an interne at St. Joseph's Hospital in Baltimore. During the

World War he served for eighteen months as an army medical officer in southern camps.

Dr. Keaney was a Fellow of the Massachusetts Medical Society having joined in 1903.

He is survived by two brothers, John and Bart of Worcester and three sisters, Elizabeth of Worcester, Anna of New York and Margaret of Newark, New Jersey.

He was a member of the Elks, Knights of Columbus and Foresters.

NOTICES

LAWRENCE CANCER CLINIC

Lawrence, Massachusetts,
March 29, 1933.

Dear Doctor:

The regular Lawrence Cancer Clinic, to be held at Lawrence General Hospital, 1 Garden Street, Lawrence, on Tuesday, April 18, at 10 A.M., sharp, will be a Demonstration Clinic with Channing C. Simmons, M.D., of Boston, Associate in Surgery at Harvard University Medical School, and Acting Surgeon-in-Chief to Collis P. Huntington Memorial Hospital, Boston, and Member of Cancer Commission of Harvard University, present as consultant. You are invited to accompany any of your patients whom you desire shall have this service, or to send them with a note, and a report will be returned to you. This service is gratis. Your attendance at the Clinic is always welcome.

Committee:

ROY V. BAKETEL, M.D.,
CHAS. J. BURGESS, M.D.,
FRED'K D. MCALLISTER, M.D.,
JOHN J. MCARDLE, M.D.,
HARRY H. NEVERS, M.D.,
THOS. V. UNIAC, M.D.,
J. FORREST BURNHAM, M.D.
Chairman.

RADIO HEALTH MESSAGES

APRIL-MAY-JUNE, 1933

Sponsored by the Public Education Committee of the Massachusetts Medical Society and the Massachusetts Department of Public Health.

Courtesy WBZ. Tuesdays, 4:30 P.M.

April

11 The Truth About Bright's Disease
18 Behavior and Health
25 Eat That You May Have Something to Eat With

May

2 High Blood Pressure
9 Goiter
16 Arteriosclerosis
23 Chronic Bronchitis
30 Neurasthenia

June

6 Safer Maternity
13 The Care of the Skin
20 A Heart to Heart Talk
27 Social Service in Public Health

STATE HOUSE BROADCAST

Sponsored by the Massachusetts Department of Public Health.

Courtesy WEEI. Fridays, 12:45 P.M.

Health Subjects of Public Interest discussed by the Division Directors of the Department.

RADIO HEALTH FORUM

Queries from the public are answered under the sponsorship of the Department of Public Health.

Courtesy WEEI. Fridays, 4:50 P.M.

Questions on Health and Prevention of Disease may be sent to: Radio Health Forum, State Department of Public Health, State House, Boston.

CLINICS IN MEDICINE AT PETER BENT BRIGHAM HOSPITAL

On Thursdays at 3:30 P.M. in the Amphitheatre of the Peter Bent Brigham Hospital Dr. Henry A. Christian, Hersey Professor of the Theory and Practice of Physic, Harvard, and Physician-in-Chief, Peter Bent Brigham Hospital, will give a series of clinics which members of the medical profession are cordially invited to attend. The next clinic will be given on April 13.

Physicians and medical students are also invited to attend ward rounds of the Medical Staff of the Peter Bent Brigham Hospital held from 10-12 o'clock on Saturdays, as well as a clinical-pathological demonstration immediately following these rounds.

AN ADDRESS BY SIR HENRY DALE

Announcement is made that Sir Henry Dale, Director of the National Institute for Medical Research of England, and one of the world's leading authorities on Pharmacology, has been selected as the principal speaker at the dedication of the new Merck Research Laboratory, to take place at Rahway, New Jersey, on April 25. Dr. Dale will arrive in this country shortly

Dr. Dale was knighted in 1932, made Commander of the British Empire (C.B.E.) in 1919, Fellow of the Royal Society in 1914; and in addition, is an M.A., M.D., and Fellow of the Royal College of Physicians.

In announcing this selection, George W. Merck, President of Merck & Co., Inc., stated that Dr. Dale will be welcomed by the following guests of honor, who have accepted invitations to be present on the occasion of the formal dedication:

Representing Chemistry and the Chemical Industry: Mr. Lammot du Pont, President of E. I. du Pont de Nemours & Co., Inc.; Chairman of the Board of General Motors, Inc., President of the Manufacturing Chemists' Association.

Representing Pharmacy and the Pharmaceutical

Industry: Mr. J. K. Lilly, President of Eli Lilly and Company.

Representing Medicine and the Public Health Service: Surgeon General Hugh S. Cumming of the United States Public Health Service.

The State of New Jersey will be represented by Governor A. Harry Moore. Over three hundred leaders in medicine and chemistry of the country will be present at the dedication.

AMERICAN DELEGATION TO THE INTERNATIONAL GOITER CONFERENCE, BERNE, SWITZERLAND

AUGUST 10, 11, 12, 1933

Under the auspices of this Association a Delegation will sail from New York, July 26, to attend the Berne Conference. This Delegation will be composed of the officers and members of the Executive Council, the members of the Invitation Committee in charge of the presentation of the formal invitation to bring the Third International Conference to America in 1937; Geographic and Delegates-At-Large from this Association; members of the medical profession, in good standing in their State or Provincial Societies, approved by the Committees in charge of the Delegation; representatives of Goiter Clinics, National Medical and Surgical bodies of Canada and the United States, the Medical Departments of the United States Army and Navy, and the United States Bureau of Public Health.

A most attractive daily round-table goiter discussion program has been arranged for the going voyage. Members of the profession desirous of joining the Delegation and who are in good standing in their State or Provincial Societies are urged to do so. They should communicate with Dr. James H. Means, Massachusetts General Hospital, Boston, Mass., geographic delegate representing the states of Maine, Massachusetts, New Hampshire, Vermont, Connecticut, and Rhode Island; Dr. J. R. Yung, Corresponding Secretary, Terre Haute, Ind., or Dr. S. D. Van Meter, Chairman of the Invitation Committee, Denver, Colo., and secure the necessary enrollment as members of the Delegation.

REPORTS AND NOTICES OF MEETINGS

MASSACHUSETTS GENERAL HOSPITAL

FRACTURE MEETING

There will be a conference under the auspices of the Fracture Service Friday evening, April 7, at 8 o'clock, in the Lower Out-Patient Amphitheatre.

SUBJECTS

Fractures of the Ankle. Dr. Leland.
Fractures of Bones of the Leg. Dr. Parsons.
Fractures of Shaft of Femur. Dr. Van Gorder.

House-officers, students and visitors welcome.

PHILIP D. WILSON, M.D.,
Associate Chief, Fracture Service.

MASSACHUSETTS GENERAL HOSPITAL

A Clinical meeting of the Staff of the Massachusetts General Hospital will be held in the Moseley Memorial Building on Thursday, April 13, 1933, at 8:15 P.M.

PROGRAM

1. "Fractures of the Neck of the Femur." Dr. M. N. Smith-Petersen.
2. "Fractures of the Ankle." Dr. George Adams Leland.
3. "Arthroplasty." Dr. Philip D. Wilson.
4. "Surgical Approach in Old Posterior Dislocation of the Elbow." Dr. George W. Van Gorder.
5. "Fractures Through Bone Cysts." Dr. Torr Harmer.
6. "Observations on Volkmann's Contracture." Dr. Henry C. Marble.

Physicians, medical students and nurses are cordially invited.

COMMITTEE ON HOSPITAL MEETINGS.

AMERICAN HEART ASSOCIATION

The Scientific Session of the American Heart Association will be held on Tuesday, June 13, 1933, from 9:30 to 5:30 P.M. in the Knickerbocker Hotel, Milwaukee, Wisconsin.

SOUTH END MEDICAL CLUB

The next regular meeting of the South End Medical Club will be held at the office of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, April 18, 1933, at 12 noon. The speaker will be William P. Boardman, M.D., Professor of Dermatology, Tufts College Medical School; Physician-in-Chief Department of Diseases of the Skin, Boston City Hospital. His subject will be "Treatment of Syphilis." The usual luncheon will be served at 1 o'clock, for which there will be a charge of fifty cents. All physicians are cordially invited to attend.

WORCESTER DISTRICT MEDICAL SOCIETY

The next meeting of the Worcester District Medical Society will be held at the Rutland State Sanatorium, Rutland, Mass., on the evening of Wednesday, April 12, 1933. A dinner will be served to the members of the Society at 6:30 P.M., after which a short business meeting will be held.

The program for the evening will consist of a talk on "Charlatinism," by Dr. Howard W. Haggard, Professor of Applied Physiology at the Yale Medical School. Dr. Haggard is author of the book "Devils, Drugs and Doctors," and other books on the history of medicine and has been delivering a series of addresses over the radio on various phases of medicine during the past winter.

ERWIN C. MILLER, M.D., *Secretary.*

HARVARD MEDICAL SOCIETY

The next meeting of the Harvard Medical Society will be held in the Peter Bent Brigham Hospital Amphitheatre (Van Dyke Street entrance), Tuesday evening, April 11, at 8:15 o'clock.

PROGRAM

Leeuwenhoek Tercentenary.

Exhibition of the Leeuwenhoek film and of famous historical microscopes.

JOHN HOMANS, M.D., *Secretary.*

WILLIAM HARVEY SOCIETY

The next meeting of the William Harvey Society will be held April 14, 8:00 P.M., at the Beth Israel Hospital.

Speakers: Dr. Ralph Pemberton, Professor of Medicine, University of Pennsylvania, Graduate School of Medicine.

Dr. Robert Bayley Osgood, Professor of Orthopedic Surgery, Emeritus, Harvard Medical School.

Subject: "Control of Arthritis."

Chairman: Dr. Cadis Phipps, Professor of Medicine, Tufts College Medical School.

ESSEX NORTH DISTRICT MEDICAL SOCIETY

May 3, 1933, Annual Meeting. One Hour of Medical History, Dr. Benjamin Spector and associated cast. Oldtown Country Club, Newburyport, at 12:30 P.M.

E. S. BAGNALL, M.D., *Secretary.*

WATERTOWN PHYSICIANS' SOCIETY

The April meeting of the Watertown Physicians' Society will be held Tuesday evening, April 11, 1933, at 128 Mt. Auburn Street, Watertown, at 8:30 P. M.

Dr. Frederick W. O'Brien will speak on "Dust Inhalation Diseases as Seen by X-ray." Illustrated.

Interested physicians are cordially invited to attend.

NEW ENGLAND PHYSICAL THERAPY SOCIETY

The regular meeting of the New England Physical Therapy Society will be held in Sprague Hall, Boston Medical Library, 8 The Fenway, Boston, at 8 o'clock, on the evening of Wednesday, April 12, 1933.

The program is in charge of DeWitt G. Wilcox, M.D., of Newton.

PROGRAM

Certain Pelvic Lesions, Where Physical Therapy Is Contraindicated. (With motion films and lantern slides.) DeWitt G. Wilcox, M.D.

Discussion will be opened by George I. Forbes, M.D., and George E. Percy, M.D.

As this subject is one of great interest it is hoped that those present will avail themselves of the opportunity to discuss Dr. Wilcox's paper; ample time has been allowed for that purpose. A large attendance is expected.

A Council meeting will be held at the Boston Square and Compass Club at 6:00 o'clock preceding the Round Table Dinner at the Club at 6:30. Councilors are urged to arrive promptly; at this meeting nominations for officers of the society will be made.

Members please note:

Council Meeting at 6:00 P.M., at the Boston Square and Compass Club.

Round Table Dinner at 6:30 P.M., at the Boston Square and Compass Club.

General Meeting at 8:00 P.M., at the Boston Medical Library.

All members of the medical profession are cordially invited to be present and to participate in the discussion.

ARTHUR H. RING, M.D., *Secretary.*

Arlington, Mass.

AMERICAN CLIMATOLOGICAL AND CLINICAL ASSOCIATION

FIFTIETH ANNUAL MEETING*

AT WASHINGTON, D. C., AT THE HOTEL WILLARD, TUESDAY AND WEDNESDAY, MAY 9-10, 1933

Part of the Congress of American Physicians and Surgeons

President: George R. Minot, M.D., Boston

The Council will meet for dinner on Monday, May 8, at 7 P.M. Place to be announced later.

NOTE: Names in *italics* are guests and not members of the Association.

NOTE: Papers strictly limited to between ten and fifteen minutes each, except as especially arranged by the President.

TUESDAY, MAY 9, 1933, 10 A.M.

President's Address. George R. Minot, M.D., Boston.

Memorial Notices

Gustave Monod, M.D., F.R.C.P., by Guy Hinsdale, M.D.

Will Howard Swan, M.D., by Wm. L. Bortree, M.D.

Elmer H. Funk, M.D., by F. M. McPhedran, M.D.

Gordon Wilson, M.D., by David R. Lyman, M.D.

Treatment of Chronic Atrophic Arthritis, with One Illustrative Case. Russell L. Haden, M.D., Cleveland.

The Prognosis in Chronic Arthritis. Russell L. Cecil, M.D., New York.

The Constitutional Factor in Migraine. George Draper, M.D., New York.

Pathological and Roentgenological Comparison of Pulmonary Tuberculosis in Humans and in Rabbits. Harry A. Bray, M.D., Ray Brook, New York.

Collapse Therapy in the Treatment of Pulmonary Tuberculosis in Negroes. Henry D. Chadwick, M.D., *R. C. Markoe, M.D., and Joseph Thomas, M.D.*, Detroit.

*Program subject to change.

The Significance of Gastritis in Relation to Other Diseases. T. Grier Miller, M.D., Philadelphia.

TUESDAY, MAY 9, 1933, 2:15 P.M.

Business Meeting

Facts on Coronary Artery Disease Based on a Survey of the Clinical and Pathological Record of 762 Cases. Robert L. Levy, M.D., Howard G. Bruenn and Dorothy Kurtz.

Clinical Observations on Aortic Stenosis. Paul D. White, M.D., and *Sylvester McGinn, M.D.*, Boston.

Clinical Aspects of Persistent Right Aortic Root. Report of Two Cases. Howard B. Sprague, M.D., *Carl H. Ernlund, M.D., and Fuller Albright, M.D.*, Boston.

Protection of the Extremities Against Cold. *Ronald T. Grant, M.D.*, Lecturer, University College Hospital, London.

Theoretical Considerations Concerning the Mechanism of Cardiac Failure. E. Cowles Andrus, M.D., and *Paul Padget, M.D.*, Baltimore.

Syphilitic Disease of the Coronary Arteries. Maurice C. Pincoffs, M.D., and *William S. Love, Jr., M.D.*, Baltimore.

Spontaneous Rupture of the Auricle of the Heart; Clinical Electrocardiographic and Pathologic Features. L. Whittington Gorham, M.D., *F. S. Randles, M.D., and M. E. Dresbach, M.D.*, Albany.

The Syndrome of Obstruction in the Lesser Circulation. James J. Waring, M.D., and *W. C. Black, M.D.*, Denver.

TUESDAY, MAY 9, 8 P.M.

Congress meeting at the National Museum, Constitution Avenue and Tenth Street. Address and reception of the president, Harvey Cushing, M.D.

SCIENTIFIC SECTION

WEDNESDAY, MAY 10, 1933, 9:30 A.M.

The Causes of Death from Heat in Massachusetts. George C. Shattuck, M.D., Boston.

Steatorrhea, with Report of Cases. Joseph H. Pratt, M.D., Boston.

The Relation of Chronic Sinus Disease to Other Diseases of the Respiratory Tract, Notably Bronchial Asthma. Richard A. Kern, M.D., and *Harry P. Schenck, M.D.*, Philadelphia.

Further Observations on the Nature of Allergy. Francis M. Rackemann, M.D., Boston.

Report of a Case of a Fatality Resulting from Focal Infection, with a Consideration of Teeth Tragedies Resulting Therefrom. Walter R. Steiner, M.D., Hartford.

The Relation of Vitamin Deficiency to Focal Infection. David T. Smith, M.D., Durham, N. C., and *Susan G. Smith, M.A.*

Rheumatic Infection in Virginia. J. Edwin Wood, Jr., M.D., and *Andrew D. Hart, M.D.*, University, Va.

Studies of Acute Infection of the Upper Respiratory Tract. Alphonse R. Dochez, M.D., New York.

Business Session at 12 o'clock

Election of Officers and New Members

WEDNESDAY, MAY 10, 2:30 P. M.

Congress Meeting at the National Museum, Constitution Avenue and Tenth Street. General Scientific Session.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

April 7—Massachusetts General Hospital Fracture Meeting. See page 768.
April 11—Harvard Medical Society. See page 769.
April 11—Watertown Physicians' Society. See page 769.
April 12—The New England Dermatological Society. See page 612, issue of March 16.
April 12—New England Physical Therapy Society. See page 769.
April 13—Massachusetts General Hospital, Clinical Meeting. See page 768.
April 13—Clinics in Medicine at Peter Bent Brigham Hospital. See page 767.
April 14—William Harvey Society. See page 769.
April 18—Lawrence Cancer Clinic. See page 767.
April 18—South End Medical Club. See page 768.
May 8, 9, and 10—American Gynecological Society. See page 516, issue of March 2.
May 9-10—American Climatological and Clinical Association. See page 769.
June 13—The American Board of Obstetrics and Gynecology. See page 607, issue of March 16.
June 13—American Heart Association. See page 768.
August 10, 11, 12—American Delegation to the International Goiter Conference. See page 768.
October 9-12—American Public Health Association. See page 403, issue of February 16.

DISTRICT MEDICAL SOCIETIES

ESSEX NORTH DISTRICT MEDICAL SOCIETY

May 3—Wednesday, Annual Meeting. See page 769.

ESSEX SOUTH DISTRICT MEDICAL SOCIETY

Tentative Program

Thursday, May 4, 1933—Censors' Meeting, Salem Hospital, 3:30 P.M.
Tuesday, May 9, 1933—Annual Meeting. Salem Country Club, Forest Street, Peabody. Golf in afternoon; greens fee $2.00. Dinner at 7 P.M. Speaker: Dr. George Burgess Magrath. Subject to be announced later. Ladies invited.

R. E. STONE, M.D., Secretary.

FRANKLIN DISTRICT MEDICAL SOCIETY

Meeting will be held at the Weldon in Greenfield on the second Tuesday of May.

CHARLES MOLINE, M.D., Secretary.

MIDDLESEX EAST DISTRICT MEDICAL SOCIETY

May, at the Meadowbrook Club, Reading.

ALLAN R. CUNNINGHAM, M.D., Secretary.

NORFOLK DISTRICT MEDICAL SOCIETY

May—Annual Meeting. Time, place and subject to be announced.

FRANK S. CRUICKSHANK, M.D., Secretary.
1695 Beacon Street, Brookline.

SUFFOLK DISTRICT MEDICAL SOCIETY

Wednesday at 8:15 P.M.

April 26, 1933—Annual Meeting. Election of Officers. Scientific Program—Titles and speakers to be announced later.

The Medical Profession is cordially invited to attend this meeting.

WILLIAM H. ROBEY, M.D., President,
LELAND S. McKITTRICK, M.D., Secretary

WORCESTER DISTRICT MEDICAL SOCIETY

Wednesday, April 12—See page 768.
Wednesday, May 10—The Annual Meeting. Place and program to be announced later.

ERWIN C. MILLER, M.D., Secretary.